Massachusetts Department of Conservation and Recreation

Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines

FINAL DRAFT May 2011

dcr
Massachusetts

Massachusetts Department of Conservation and Recreation

Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines

FINAL DRAFT May 2011

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard K. Sullivan, Jr., Secretary
Edward M. Lambert, Jr., Commissioner
Jack Murray, Deputy Commissioner for Park Operations

Foreword letter from the Commissioner -

To be completed after the public input process, to be able to incorporate reflections and comments on the process itself, as well as on the final criteria and guidelines.

The Massachusetts Department of Conservation and Recreation (DCR), an agency of the Executive Office of Energy and Environmental Affairs, oversees 450,000 acres of parks and forests, beaches, bike trails, watersheds, dams, and parkways. Led by Commissioner Edward M. Lambert, Jr.., the agency's mission is to protect, promote, and enhance our common wealth of natural, cultural, and recreational resources. To learn more about DCR, our properties, and our programs, please visit us at www.mass.gov/dcr. Contact us at mass.parks@state.ma.us.

PRINTED ON RECYCLED PAPER

Table of Contents

(To be added)

Section 1. Introduction

1.1 Introduction

In 2009 – 2010, the Massachusetts Department of Conservation and Recreation (DCR) together with its partners and stakeholders undertook a year-long initiative to develop a renewed vision and long-term strategy for managing the 311,000 acres of forested lands in the State and Urban Parks system. This effort, the Forest Futures Visioning Process (FFVP), explored the wide range of ecosystem services provided by these lands and their place in the overall context of the Commonwealth's three million acres of public and private forests. The process sought to balance forest management practices with other uses and activities so that these lands may continue to provide a range of public benefits to future generations. The FFVP, which involved forest resource experts, stakeholders, and the general public, resulted in a set of ten recommendations to DCR for the improvement of forest stewardship practices.[1]

DCR has committed to adoption of the core set of recommendations of the FFVP – specifically, elevating the role of forest stewardship through the creation of a Director of Forest Stewardship position, improving public process relative to management decisions impacting DCR lands, adoption of an ecosystem services model to guide management decisions, and creating a new land use management structure as a means to identify and delineate compatible activities within DCR parks and forests. These efforts are more than just changes in how DCR approaches forestry – rather, they represent a new direction for strategic land stewardship for DCR.

The implementation of these recommendations has provided DCR with the opportunity to map the ecosystems for all DCR State and Urban Parks and Forests – an effort that supports not only the new land use management structure, but is also be beneficial to other resource planning efforts. This also marks the first time the agency has reached out to stakeholders and the public to solicit input on land use management decisions at a statewide scale.

1.2 Background

DCR, with facilitation by the Massachusetts Office of Public Collaboration (MOPC), launched the FFVP in April 2009. The agency undertook this process at the suggestion of the DCR Stewardship Council, in response to public criticisms of some of DCR's forestry practices and in recognition of the need to engage the public in an active dialogue about land management within the DCR State and Urban Parks system. Led by a Technical Steering Committee (TSC) composed of individuals with a high level of expertise on issues, trends, and best practices in climate change, forest conservation and ecology, invasive species, landscape ecology, natural resource economics and law, recreation, silviculture, social policy, visual/aesthetics, watersheds, and wildlife habitat, and guided by an Advisory Group of

[1] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010. This can be found at: http://www.mass.gov/dcr/news/publicmeetings/tsc_final_recommendations.htm

Stakeholders, the FFVP involved five public forums that were attended by over 500 individuals and received over 1,000 comments during the course of the process.

In its final recommendations report, the TSC encouraged DCR to embrace a "land management paradigm shift … moving the Department's forest management towards a vision based on a more comprehensive suite of ecosystem services."[2] The concept of ecosystem services, as developed through the 2005 Millennium Ecosystem Assessment[3], relates to the benefits provided to humans and the environment by ecosystem resources and processes. These services can be broken into four broad categories: provisioning, regulating, supporting, and cultural. The TSC focused on the need for DCR lands to be managed for the provision of ecosystem services to the public that are not consistently delivered by private lands. These services include: carbon sequestration, soil, air and water quality, biological and ecosystem diversity, nutrient cycling, culture, history, spiritual values, public recreation, and renewable wood products.

To achieve this vision, the TSC provided a set of ten recommendations for DCR, primary among these recommendations is that DCR adopt a new land use management structure that incorporates a system of designating the 311,000[4] acres of DCR parks and forests at a statewide scale into three different zones—reserves, parklands and woodlands—so that incompatibilities among the various ecosystem services can be prioritized and managed system-wide as well as prioritized within the individual zones in an effort to maximize outdoor recreational experiences on DCR lands. Taken together, these recommendations will impact every forest, park, and reservation in DCR's State and Urban Parks system.[5]

1.3 Landscape Designation Overview

DCR is adopting a new land use designation system for the State and Urban Parks system structured around the designation of DCR lands as Reserves, Parklands or Woodlands, based on primary land use characteristics and suitability. In order to balance the provision of ecosystem services and activities on these lands, the FFVP recommended target acreage allocation ranges for each designation. These targets are:

- Reserves: 90,000 - 120,000 acres
- Parklands: 70,000 - 90,000 acres

[2] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p. 6.

[3] The 2005 Millennium Ecosystem Assessment was an international scientific effort that identified a connection between ecosystem services and human well-being, and divides these services into provisioning services, regulating services, and cultural services. Launched by the United Nations in 2001, the assessment involved over 1,300 natural and social scientists from around the world.

[4] Note: The TSC report referred to the "308,000 acres" of DCR State and Urban Park system properties. However, today, that total is closer to 311,000 acres. The acreage figures in this document have been updated to reflect the more current total.

[5] DCR Water Supply Protection lands are not included in this process. The Division of Water Supply Protection is conducting a review of its forest management program through a separate process with assistance from a Science and Technical Advisory Committee and its legislatively-mandated Watershed Advisory Committees

- Woodlands: 100,000 - 150,000 acres.[6]

Further, the Patrick Administration has made a commitment that at least 60% of the land within the State and Urban Parks system (at least 186,566 acres), will be designated as Parklands and Reserves.[7]

Each designation has its own set of ecosystem services and management priorities:

> **Reserves** will conserve large contiguous blocks of high-value ecosystems. These are areas where the dominant ecosystem service objectives will be biodiversity maintenance, nutrient cycling and soil formation, and long-term carbon sequestration. Reserves are areas that users often value for spiritual reasons and that may provide elements of a wilderness recreational experience. There will be no commercial harvesting of timber in Reserves. Forest management would generally consist of letting natural processes take their course, although in some cases more active management might be permitted. For example, wildfire fuels management may be necessary for Reserves in Southeastern Massachusetts. Recreational activities will generally be passive, non-facility-based activities but existing authorized motorized uses will be maintained in most cases (Note: DCR's Off-Highway Vehicle (OHV) "fine-filter analysis" will guide future OHV use).
>
> **Parklands** conserve unique natural and cultural resources while focusing on the provision of recreation, human experiences. Parkland management approaches are expected to range from areas where natural processes dominate to highly modified environments where use is intensively managed. While wood production will not be a management objective in Parklands, some vegetation management to support recreational use, or to ensure public safety or ecological integrity may take place (e.g., removal of hazardous trees, clean up of storm or insect disease damage around facilities, maintenance of unique habitats upon advice of the Division of Fisheries & Wildlife, etc.).
>
> **Woodlands** conserve a range of forest ecosystems, where sustainable forestry activities will continue alongside recreational activities (harvest sites will be closed to the public, but only occur on a small fraction of the land, with many years between harvests on any given site). These areas will provide a range of ecosystem services, including production of high-quality, local, renewable wood products, protection of water quality, carbon sequestration, and both late forest successional structures, and in focused areas, early forest successional stages to promote habitat diversity. Commercial harvesting that demonstrates a range of "excellent forestry" through the application of best management practices will be the applied management standard, and there will be opportunities to have demonstration forests to educate landowners and the general public. While the emphasis will be on uneven aged management, openings of up to five

[6] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p. 35.

[7] *Patrick-Murray Administration Announces Commonwealth Forest Heritage Plan.* Press Release, April 21, 2010. Available at: http://www.mass.gov/dcr/news/2010/pr10-4-21.pdf. Also, see Footnote #4.

acres may occur under exceptional circumstances after intensive review and approval by the DCR Commissioner. Forest management will also play a role in the ecological restoration of areas that have been significantly altered by past management practices, such as plantations of non-native species and high-grade harvests.

1.4 Implementation Process

In Spring 2010, after the release of the Final Report from the FFVP, DCR formed an Internal Working Group composed of staff with expertise in planning, natural and cultural resource protection, forestry, recreation, environmental education and interpretation, and park operations (see Appendix 1) to develop a framework for designating lands within the DCR State and Urban Parks system as Reserves, Parklands and Woodlands. With the FFVP Final Report and the Patrick Administration's endorsement and policy direction as their guide, the Internal Working Group produced a draft set of selection criteria and management guidelines to share with the public.

In November and early December of 2010, DCR hosted a series of seven public workshops across the Commonwealth to solicit public input on the selection criteria used in the designation process, as well as public input on the draft management guidelines. The selection criteria and the management guidelines were fine-tuned based upon the public feedback received. The selection criteria and Geographic Information Systems (GIS) software were used to develop three models (one each for Reserves, Parklands and Woodlands) that were used to map the three designations, using available digital data.

The **Reserves Model** rated DCR State and Urban properties using the Department of Fish and Game Natural Heritage and Endangered Species Program's (NHESP) recently released BioMap2 data and output from a collaborative effort between The Nature Conservancy (TNC) and DCR to map eleven Ecological Land Units (ELUs). The purpose of designating ELUs was to identify and distribute potential reserves across the state's forested ecosystems (i.e., areas with similar topography, geology and elevation) and to identify lands with the highest forest core values and best landscape level characteristics within each ecosystem.

The **Parklands Model** rated DCR State and Urban properties based on high trail density, high population density and known intensive use areas.

The **Woodlands Model** ranked DCR State properties only (the necessary datasets were not available for DCR Urban properties) for their suitability as productive Woodlands based upon soils, forest type, and lands that could benefit from silviculture.[8]

Internal agency review of the applied designation criteria followed, to ground truth the application of the three designations. A second round of public meetings is planned for Spring 2011, at which time DCR will present the draft application of the selection criteria and the resulting landscape designations proposals for DCR State and Urban Park property for public review and input before finalizing the new system of land use management.

[8] The selection criteria for each designation are described in full in the three sections of the report that follow. The three GIS models, and the datasets utilized to meet the selection criteria identified, are explained in Appendix 5.

1.5 Integration of Landscape Designation with Other Planning Activities

In recommending Landscape Designation for the DCR parks system, the TSC recognized both the broad, statewide scale at which Parklands, Woodlands and Reserves would be identified, and it also understood that DCR would incorporate new, more specific knowledge over time to inform management at the district and property levels. The TSC also emphasized the need for DCR to better integrate and coordinate all of the planning functions within the agency, and DCR is working toward this goal. Going forward, DCR will now plan the management of DCR properties in the State and Urban Park system at two different levels:

1) Statewide Level: Landscape Designations, described in detail in this document, will guide land use management activities based on a balance between conservation and recreation for properties throughout the DCR parks system. Land at this scale will be designated as Parklands, Reserves, or Woodlands.

2) District and Property Level: Land Stewardship Zoning (LSZ) is a finer level assessment applied at the property scale through the Resource Management Plan (RMP) process.[9] LSZ incorporates site specific information to guide the management and the protection of resources and areas within a property.

Land Stewardship Zoning will be applied to individual properties through the RMP process by incorporating site specific information to guide the management and the protection of resources and areas within a property. Land at this scale will be recognized as zones 1, 2 and 3 to categorize resources, relative to sensitivity to human activities.

These two systems will work in coordination with each other to set high-level land management priorities based on ecosystem services, and to supplement those priorities with site specific resource protection and management guidelines.

Landscape Designation

The rest of this document is dedicated to detailing the criteria under which Landscape Designations are being applied to DCR State and Urban Park system properties, and to the guidelines that will inform management of each designation.

Land Stewardship Zoning and Resource Management Planning

During the preparation of an RMP, at the property scale, resource inventory and assessment leads to the "zoning" of specific areas within the property based on resource significance, sensitivity to recreation and management activities that are typical for that facility. Through this process, site-specific resource information provides guidance for land use management and stewardship of these resources. Three Land Stewardship Zones provide a general continuum to categorize resources, relative to their sensitivity to human activities:

[9] See MGL Chapter 21, Section 2F. The DCR Land Stewardship Zoning guidelines can be found at: http://www.mass.gov/dcr/stewardship/rmp/lszguidelines.htm

- **Zone 1**, the most protective zone, encompasses areas with highly sensitive resources that require special management approaches and practices to protect and preserve their special features and values.
- **Zone 2** encompasses typical yet important natural and cultural resources. Zone 2 is the keystone to DCR's management responsibilities, because the protected landscape provides a buffer for sensitive resources, recharge for surface and groundwater, and large areas where typical public recreation activities can be managed at sustainable levels.
- **Zone 3** encompasses already developed landscapes or areas that may be suitable for future development as intensive use areas.

Significant Feature Overlays are used to identify resource features formally recognized or designated through research and assessment by professional resource specialists, who have developed specific management guidelines for the resource feature. The Significant Feature Overlay can be applied across all three Land Stewardship Zones. Examples of Significant Feature Overlays include historic districts listed on the National Historic Register, or Public Water Supply Districts.

Specific management guidelines associated with each LSZ zone are intended to provide additional protection and stewardship for site-specific natural and cultural resources and to ensure consistency among the activities that are allowed in each property under the broad management guidelines described for each Landscape Designation. All three LSZs may exist in all three of the Landscape Designations with Landscape Designation guidelines superseding LSZ if there is a conflict. In addition, Landscape Designations will inform the RMP process and the application of LSZ zones.

Patch Reserves

The TSC recommended that DCR designate "patch reserves" within the Parkland and Woodland Landscape Designations to identify areas where standard best management practices may not be adequate to fully protect highly significant and sensitive ecological or cultural resources from certain human uses or management and to recognize areas of special significance to park users and the public.

DCR will identify sensitive resources and apply specific management guidelines to protect them by categorizing them as Zone 1 in the LSZ system during the RMP process. DCR believes the term "patch reserve" has different meanings for different people, and as the TSC pointed out, these areas should be selected by different criteria and have an altogether different set of goals than the land designated as landscape-level Reserves. Therefore, DCR will meet the intent of "patch reserves" as described in the TSC report through identifying Zone 1 areas.

Forest Resource Management Plans

Prior to the FFVP, four comprehensive Forest Resource Management Plans (FRMPs) were prepared at the forestry district level, covering the Northern Berkshire district, the Central Berkshire district, the Southern Berkshire district, and the Western Connecticut Valley district. These FRMPs include significant data analysis and public input, a review of current conditions and a vision for future forest conditions, along with short and long term strategies to reach those desired future conditions. The four existing FRMPs will be evaluated, edited and expanded to reflect Landscape Designations and

incorporate the guidelines presented in this document. In addition, Landscape Designations will supersede the Active Forest Resource Management Areas, Intensive Use Areas, and Forest Reserves that were established in the FRMPs.

Once the Woodlands designations are finalized, DCR will undertake projects to demonstrate excellent forestry according to the Woodlands guidelines included in this document. Until the existing FRMPs are updated and new ones are completed for all remaining areas, the Woodlands guidelines will supersede the guidelines in the existing FRMPs.

Future FRMPs will identify different levels of silvicultural treatments that will be applied to guide sustainable forest management in Woodland properties. These silvicultural levels and guidelines are further detailed in the Woodlands section of this document. Information from FRMPs will be incorporated into RMPs, including the integration of forest management strategies with Land Stewardship Zoning, where appropriate.

Other Planning Tools

In addition to Landscape Designation, Resource Management Plans and Forest Resource Management Plans, DCR may employ a number of different planning tools as appropriate for the various complex problems, resources, and issues that faced on a daily basis. Examples of such planning tools include Master Plans that may be developed for a complex capital project (e.g., the Blue Hills Trailside Museum Master Plan) and Comprehensive Interpretive Plans that may be developed to guide education and interpretation at a facility (such as the Mount Greylock Reservation Comprehensive Interpretive Plan.) Each of these tools is tailored to specific needs and issues and provides for resource protection. These will be informed by the Landscape Designation of a given property. These planning tools may also be used and completed in conjunction with, prior to, or following an RMP, and may help inform or be informed by an RMP.

Prior to completion of an RMP, DCR's objective is to provide stewardship for natural and cultural resources based on compliance with applicable state and federal regulations and a variety of professionally derived resource management guidelines, and to maintain facilities to meet state health and building codes. The following is a partial list of regulations and resource management guidelines that are used to review and guide proposed management activities, facility development, and planning processes for DCR's forests, parks and reservations. It is important to note that proposed facility development and management activities that go beyond routine maintenance, and comprehensive planning processes will be preceded by a robust public review process including public meetings and consideration of public comment.

- DCR Best Practices for Protection Historic Buildings.
- DCR Historic Parkways Preservation Treatment Guidelines.
- DCR Old Growth Policy
- DCR Trails Guidelines and Best Practices Manual.
- Federal and Massachusetts Endangered Species Act.
- Guidelines for agency activities in Areas of Critical Environmental Concern.

- Massachusetts Historical Commission (MHC) Guidelines for protection of properties included in the State Register of Historic Places.
- Guidelines for protection of archaeologically sensitive areas (DCR Archaeologist and MHC).
- Massachusetts Environmental Policy Act review for projects that trigger specific thresholds.
- Massachusetts Forest Cutting Practices Act.
- Massachusetts Wetlands Protection Act, including project review by local Conservation Commissions.
- NHESP Forestry Conservation Management Practices for Rare Species.
- Office of Coastal Zone Management Guidelines for Barrier Beach Management.
- Regulations and guidelines associated with ground and surface water quality, public water supplies, and waterways.
- Watershed Protection Act.

In addition to the regulations and resource management guidelines listed above, DCR will carefully consider these factors when planning forest management projects:

- Wetlands and vernal pools
- Trail buffers
- Steep Slopes
- Sensitive Historical Sites
- Rare Species Habitat
- Old Growth Forests
- Riparian Areas
- Rare Plant Communities

These factors are evaluated on the ground when planning forest management projects and are part of the "Level 1" Silviculture where harvests will be excluded or deferred (see Woodlands section below) and will protect the resources of areas that will become "Zone 1" designations and other areas prior to the completion of RMP's.

1.6 Implementation Review and Improvement

The TSC urged DCR to adopt a process of adaptive management, so that insights gained from implementation of TSC recommendations can be used to improve future management decisions.[10] DCR agrees that there will be a need to analyze the effectiveness of both the landscape designation and the management guidelines in terms of their success in meeting the goals of each zone. There is also recognition that new site-specific information will come to light through RMPs and other research and planning efforts, and there will be a need to consider and incorporate new information to improve management.

[10] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p. 25; p. 43. A model for such is provided by the *Open Standards for the Practice of Conservation* (Conservation Measures Partnership, Version 2.0, October 2007).

DCR will review both the landscape designation and the management guidelines every 10 years to assess their effectiveness in reaching the agency's goals of providing for the broad range of ecosystem services and to make any necessary adjustments in response to the assessment as a means of increasing effectiveness.

Within the TSC report and this document are many recommendations and commitments that will require extensive staff time and funding. In the current challenging budget times, DCR will do its best to implement the highest priority items in these guidelines. One way to make incremental progress is to undertake pilot projects. DCR will explore the possibility of working with one community to pilot a "community demonstration forest" on a small DCR property. The importance of developing demonstration forests in cooperation with local towns is an important tenet of the TSC report. DCR has a number of small isolated properties (for example lands acquired as flood control or reforestation properties many decades ago). This pilot could demonstrate how motivated towns with expertise and public support for excellent forestry and local wood products can work cooperatively with DCR. This property would also have attributes that make it a good candidate for a demonstration forest, such as forest conditions that can benefit from uneven aged, late successional restoration projects and good access for forestry and public education. If successful, the pilot could be extended and possible expanded to other appropriate small DCR properties with appropriate forest conditions.

1.7 Landscape Designations and Management Guidelines

Details on the three landscape designations – Reserves, Parklands, and Woodlands – are presented in the following pages. The description of each landscape designation begins with a statement of purpose, the TSC recommendation for the management approach for each designation, and a short list of primary ecosystem service objectives. This is followed by a discussion of this designation and any special considerations, plus the selection criteria that will be used to identify the appropriate property for this land use. The discussion concludes with the management guidelines for that designation.

Section 2. Reserves

The primary purpose of setting aside large areas of forest as Reserves is to allow forests to develop relatively unimpeded by human disturbance and to create late successional habitat. Given a sufficient amount of time without major disturbances, the forest will develop characteristics associated with true old growth forest. These late successional and old growth conditions include a wide diversity of tree sizes and ages, tip-up mound topography, and micro-site conditions from fallen trees and large amounts of downed woody debris. Another reason for the establishment of Reserves is to provide areas where forest conditions can be influenced solely by natural (versus human-caused) disturbances, where natural disturbance regimes can play out indefinitely, and where visitors will be able to experience these unique conditions first hand. Users of Reserves often value them for spiritual reasons since they may provide elements of a wilderness recreational experience.

It is anticipated that Reserves will also provide an aspect of biodiversity less prevalent in the rest of the forests so it is important that the system of Reserves contains representatives from the main forest types across the Commonwealth.[11]

2.1 Management Approach for Reserves

Reserves are meant to contain natural features across a landscape, ideally located across the state representing different ecological settings. Reserves are also intended to be several thousand acres in size to provide adequate protection of resources, with the potential to be increased over time (either via state or local land conservation efforts or by co-management of non-state protected forest) to reach sizes of 10,000 to 15,000 acres. The Nature Conservancy recommends large Reserves in the Eastern United States be a minimum of 15,000 acres; the Division of Fisheries & Wildlife recommends a minimum of 5,000 acres; and BioMap2[12] selects "forest cores" (the least fragmented remaining forests) at a minimum of 500 acres in eastern Massachusetts, 1,500-2,000 acres in Worcester County and the Berkshire Plateau, and 3,000+ acres for the Taconics.

While large contiguous blocks of land are important to Reserve creation, DCR believes that they can also be effective at smaller scales. DCR anticipates that Reserve sizes will vary by region due to several factors, including the level of development within properties as well as the size of DCR properties throughout the state. DCR used the guidance provided by the BioMap2 in selecting "forest cores" to adjust the minimum sizes for "Large Reserves" across the state so that this designation is not limited to large properties in the Berkshires. In addition, the new and more detailed Ecological Land Units developed by DCR in collaboration with TNC will contain representation among Reserves as well as Parklands and Woodlands.

Management approach recommended by the Technical Steering Committee:

> *Management of large forest reserves should allow ecological processes to determine the long-term structure, composition, function, and dynamics of the forest to the maximum extent possible.*

[11] Major forest types found in Massachusetts include: White/Red Pine, Hemlock, Spruce-Fir, Pitch Pine – Scrub Oak, Northern Hardwoods, Birch-Red Maple, Oak, Swamp softwoods, and Swamp hardwoods.

[12] See: http://www.mass.gov/dfwele/dfw/nhesp/land_protection/biomap/biomap_home.htm

However, the areas that have been considered for large reserves range widely in their natural and historical disturbance regimes. In this context, flexible yet thoroughly vetted reserve management will support ecological functions in the varied forest ecosystems of the Commonwealth and under the ecological and climatic uncertainties of the future.[13]

The dominant ecosystem service objectives in Reserves will be:

- biodiversity expansion, including complex forest systems;
- carbon sequestration;
- provision of wilderness recreation opportunities.

Reserves management should allow natural processes to determine the long-term structure, composition, function and dynamics of the forest to the maximum extent possible. Equally important is monitoring and studying these conditions, then applying this knowledge to low impact forest management techniques within Parklands and Woodlands, and on privately-managed forests.

The TSC also recommended the formation of a Forest Reserves Science Advisory Committee, consisting of conservation biologists and forest ecology experts to assist with Reserve selection as well as review major restoration and management activities within Reserves.[14] The Patrick Administration supported this recommendation, and DCR will be forming such a committee to provide guidance on vegetation management and assist with long term scientific monitoring and research opportunities within Reserves.

2.2 Selection Criteria for Reserves

FFVP Recommended Allocation: 90,000 to 120,000 acres

Approximately 40,000 acres of State Park and Forest lands are currently designated as Reserves.[15] GIS models based upon a continuum using the best available data were utilized to guide the selection of additional Reserves. The most favorable units of land for designation as additional Reserves are those:

- with least fragmented tracts of land
- with the highest amount of forest interior
- that are well buffered from development
- that are contiguous with other protected land
- that represent a major ecological setting in the Commonwealth
- that conserve ecological and evolutionary processes
- that are large enough at a regional scale to capture a range of ecological processes
- that provide redundancy within each ecological land unit
- that contain special attributes, such as old growth or continuously forested sites

[13] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p.44.
[14] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p.37.
[15] The existing Reserves are at Chalet, East Branch, Otis, Mohawk/Monroe/Savoy, Middlefield/Peru, Mt Greylock, Mt. Washington and Myles Standish. Reports documenting the baseline characteristics of many of these Reserves are found at: http://www.mass.gov/dcr/stewardship/forestry/index.htm

- with limited recreational infrastructure
- with a low density of officially designated trails

For these criteria, several existing data sets were drawn upon from outside sources, including the forest cores identified in BioMap2, DCR's new ecological land units (in collaboration with TNC), and the Massachusetts Division of Fisheries & Wildlife's (DFW) forest interior data.

The new Ecological Land Units were completed in collaboration with The Nature Conservancy, which previously produced ELUs for a region from Virginia to New Hampshire that were used to select candidate areas for the nine Large Reserves designated by the Executive Office on Energy and Environmental Affairs several years ago. Those ELUs utilized geology, elevation and landform to map where different ecosystems occur. The ELUs mapped very large landscape units where the majority of the land was in one ELU.

For the current designation process, DCR felt it was important to update that process so that more refined ELUs could be mapped at a DCR property level. For example, if a 5,000 acre DCR property was part of a 100,000 acre ELU, the attributes of that property may or may not reflect the designation of the overall ELU. The current process will be more useful in the designation of all DCR properties and will allow DCR to balance Reserves, Parklands and Woodlands within each of the 11 new ELUs.

Having Woodlands and Parklands in all of the ecosystems of the state also has inherent value for the demonstration forest and wildlife values of Woodlands and the environmental education and outdoor recreation values of Parklands.

2.3 Wilderness Areas

The TSC also suggested that DCR consider establishing one or two wilderness areas within Reserves that would have further restrictions placed on them in order to maintain a wilderness character.[16] Wilderness means different things to different people, so in an effort to minimize conflicting interpretation of the term, DCR looked to the National Wilderness Preservation System, the largest systematic wilderness management program in the nation, for guidance on designating and managing suitable lands. The Wilderness Act of 1964, the prevailing document which guides management of wilderness areas on federal land, defines wilderness this way:

> *A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped . . . land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural*

[16] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p. 38.

> *conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.*[17]

There are few, if any, areas in Massachusetts that are "untrammeled by man," and have "at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition."

The TSC suggested looking into adapting DCR's existing Wildlands Program to apply to potential wilderness areas. Under that program, Wildlands are broken into two categories: Representative Natural Areas (RNAs) and Backcountry Areas. RNAs identify natural areas distinct from their surroundings that are so special as to require additional protection (e.g. the 5-acre Atlantic White Cedar Swamp in Douglas State Forest). All of these areas are significantly smaller than the necessary acreage to be an outstanding opportunity for solitude. Backcountry areas in the program are larger, but are designed to be accessible and are therefore neither remote enough to meet the "untrammeled by man" criteria nor the solitude criteria (e.g. the old growth forest in Savoy State Forest, which abuts Route 2). While not wilderness, backcountry areas are already within existing reserves. In this way DCR's Wildlands program is effectively absorbed and expanded by the expansion of the Reserve system, but they are not the appropriate source for wilderness areas.

However, in time, some areas within the Reserve system may approach the high standards set by the Wilderness Act of 1964. Therefore, DCR is proposing not to designate any Wilderness Areas at this time, but to review Reserves every five years for areas that are suitable for designation as Wilderness Areas in the future. Lands designated in the future as Wilderness Areas would be managed similarly to land in the National Wilderness Preservation System.

2.4 Management Guidelines for Reserves

Once land is designated as a Reserve, there are some significant threats that may impede natural processes in Reserves. These include:

- fragmentation and destruction of adjacent forests due to residential or commercial development
- disruption of ecological processes from invasive species and climate change
- inconsistent enforcement of management policies
- unregulated recreational use such as off highway vehicle trespass
- human-caused wildfires

[17] Public Law 88-577 (16 U.S. C. 1131-1136), Wilderness Act of 1964.

- development of dense trail systems or heavy use of trails and potential habitat fragmentation, soil compaction, and wildlife disturbance

Most DCR properties are less than the 15,000 acres recommended through the FFVP by The Nature Conservancy and the TSC as the minimum size of Reserves. Therefore it will be critical to work toward the protection of forested lands adjacent to Reserves to help retain the large forest blocks envisioned for Reserves. DCR will look for significant assistance in this task from statewide and regional conservation organizations.

Another threat to the value of Reserves is the lack of resources for monitoring and study. Since it will take decades for Reserves to look and function differently than other forests, it is important to document the changes so that the public can learn of their values and so this knowledge can be applied to the management of other forests in the Commonwealth. Given the lack of public funding for Reserve monitoring, it is paramount that private conservation organizations find ways to consistently provide monitoring support. DCR plans to elicit partnerships to assist with monitoring Reserves to assess the efficacy with which designation and management of Reserves is meeting this designation's goals.

In general, removal of trees and other vegetation (including commercial or salvage harvests) will not be allowed in Reserves. However, some situations may call for ecological restoration and vegetation management. Situations where some management may be appropriate include the removal of invasive species or for the protection of existing rare species. Fire adapted Reserves in Southeastern Massachusetts may require active restoration and management to maintain habitat for rare species and reduce the risk of catastrophic wildfire that can threaten human health and safety. Insect infestations, such as the recent discover of the Asian Longhorned Beetle in the Worcester area, may also necessitate more active control and management activities than would normally be considered appropriate in Reserves. Finally, some management flexibility will be needed for Reserves that are part of municipal water supply watersheds, so that unanticipated future threats to those water supplies can be dealt with in effective and appropriate ways (in consultation with FRSAC, the municipal water supplier and/or the Department of Environmental Protection.) Some management flexibility, with the safeguards discussed below, is crucial to maintain Reserve functions given the diversity of forest types, and the tremendous range of land use histories and disturbance regimes across the Commonwealth.

In order to consistently guide DCR in these decisions, the Forest Reserves Science Advisory Committee, consisting of conservation biologists and forest ecology experts will provide guidance on vegetation management and assist with long term scientific monitoring and research opportunities within Reserves.

Recreation and Public Access Guidelines:

A. Recreational activities that are compatible with Reserves include dispersed, non-motorized activities, including hiking, hunting, fishing, cross-country skiing, snowshoeing, mountain biking and horseback riding. Existing property specific regulations and policies apply. Off Highway Vehicles, other than snowmobiles, are prohibited. However, where currently designated as an approved use prior to Reserve designation, OHV use may be continued if consistent with the

OHV coarse and fine filter selection criteria and managed to minimize natural resource impacts and use conflicts.

B. Snowmobile use shall be limited to designated trails and forest roads that are not maintained for vehicle use. Existing use regulations and policies apply.

C. Development of new intensive-use recreation sites (such as campgrounds, picnic areas, visitor centers, administrative offices, parking lots, etc.) is not permitted.

D. New trail construction is permitted only after the trail has been reviewed by DCR staff using the guidance and procedures established by the "DCR Trails Guidelines and Best Practices Manual." Trail density and use levels will be evaluated to see how they may affect the values of the Reserve.

E. Trail relocations to reduce adverse impacts to critical resources will be prioritized. DCR will strive to maintain a low density of trails that are not highly developed (class 1-3[18]) within Reserves to protect their ecological and recreational intent. DCR may engage in trail closures to achieve the values of Reserves.

F. DCR will work with local fire and safety officials in local towns to balance the need for fire and rescue access with the above goals for trail access in Reserves.

G. DCR will examine vehicle use on public roads that cross reserves to see if fire and public safety access could be maintained and Reserve qualities enhanced by gating these roads. Any closing of public roads to vehicles would not negatively impact access to camping areas or other facilities and would require close communication with the local towns and public safety officials.

Silviculture and Vegetation Management Guidelines:

A. Habitat manipulation, silvicultural treatments and commercial harvesting operations are not permitted in Reserves. However, if deemed appropriate by DCR and reviewed by the FRSAC, the following exceptions may be allowed:

   a) Implementation of Natural Heritage and Endangered Species Program recommendations to restore, maintain or enhance habitat for rare and endangered species and exemplary natural or rare communities.

   b) Removing plantations would not be permitted except to restore important wildlife habitat such as pitch pine barrens or other habitats after consultation with DFW and FRSAC. Removing non-native invasive species.

   c) Managing vegetation to control erosion, or to stabilize soils.

[18] Class 1 trails are Minimal/Undeveloped Trails, Class 2 trails are Simple/Minor Development Trails, and Class 3 trails are Developed/Improved trails. For more info on these classifications, please see the *DCR Trails Guidelines and Best Practices Manual*, updated January 2010, pp 37 – 38. Available at: http://www.mass.gov/dcr/stewardship/greenway/docs/DCR_guidelines.pdf

d) Cutting of vegetation to maintain established public vistas and trails is permitted (e.g. the small Spruce Mountain vista located in Monroe State Forest).

e) Removal of hazardous trees directly adjacent to trails that pose significant risk to public safety.

f) Vegetation management is permitted by parties who have secured pre-existing rights (eg. Easement holders, utility easements) to perform such activity, subject, however, to standard regulatory and permitting requirements.

g) Cutting vegetation to maintain existing agricultural fields or existing wildlife habitat openings is permitted.

B. Creation of new fields, vistas and wildlife openings is prohibited.

Water and Soil Resource Guidelines:

A. Management may be permitted to control erosion or stabilize soils, by closing roads and unauthorized trails, or other means such as stabilizing slopes with water bars or other erosion control structures. Input from local emergency management officials will be sought for consultation on road closures, and review by the FRSAC will be requested for significant work of this type.

B. Where DCR Reserves occur on local or regional public water supply watersheds, appropriate management activities may be undertaken (after consultation with the public water supplier, FRSAC and/or DEP) to address water quality protection issues (e.g., due to wildfires, insect or disease outbreaks, or other unanticipated threats to water quality). See Appendix 2 for a list of DCR properties on public water supply watersheds.

Habitat Protection Guidelines:

A. Identification, documentation and protection of rare species occurrences and important habitats will be addressed using the following tools:
    a. Review of the Massachusetts Natural Heritage and Endangered Species Program GIS database, which includes datalayers from statewide databases such as BioMap2, , Priority Habitats of rare species, Estimated Habitats of rare wildlife, Certified or Potential Vernal Pools, and Natural Communities.
    b. Review of and consultation with other sources of natural resource information, where appropriate and available (e.g., Mass Audubon, New England Wildflower Society, The Vernal Pool Association and other NGOs, local naturalists, etc.)
    c. Surveys and monitoring (for project specific purposes or long-term documentation), by trained DCR staff and/or outside consultants, to document and map rare species and important habitats when necessary.
    d. If any state listed species are listed pursuant to the U.S. Endangered Species Act (16 U.S.C.A. §§ 1531 – 1544) the US Fish & Wildlife Service must approve the project and the appropriate species Recovery Plan shall be consulted.

e. Consult and work with NHESP to identify and develop appropriate conservation practices for Natural Communities.
f. Consider certifying potential vernal pools if applicable; apply accepted Massachusetts and federal protection guidelines around all certified or potential vernal pools (304 CMR 11.00).

B. DCR will work closely with the Massachusetts Division of Fisheries & Wildlife (DFW), and consult the Comprehensive Wildlife Conservation Strategy (CWCS)[19] for guidance in protecting rare species and their habitats, and the Forestry Conservation Management Practices for Rare Species,[20] where appropriate.

C. Using the resources noted in section A, Habitat Restoration Plans should be generated to improve degraded habitats important to rare species and/or state/regional biodiversity.

D. Consult with DFW and the Massachusetts Department of Environmental Protection (DEP) prior to conducting any work adjacent to Coldwater Fisheries habitats; apply protection guidelines recommended.

E. Form partnerships with Friends groups, local naturalists, environmental organizations, etc., to assist in the identification, protection and monitoring of important habitats or rare species population where appropriate.

Forest Health and Protection Guidelines:

A. Spread of invasive epidemic forest pathogens, insects and diseases or other biological risks to the forest (such as Asian Longhorned Beetle or Emerald Ash Borer) may be controlled if there is a major threat to forest health or risk to private or public natural resources.

B. Wildfires will be contained, controlled and suppressed, unless there is an approved site specific controlled fire plan and conditions are within the fire plan prescription.

C. Fire breaks may be maintained.

D. Prescribed fire may be used when it is compatible with protection of the Reserve, restoration of native communities and ecological processes, and the protection of life and property adjacent to the Reserve and surrounding landscape. The prescribed fire burn plan would be subject to the review of the local fire chief(s) and the FRSAC.

E. Where the use of pesticides is the only feasible method to remove invasive species that threaten the values of the Reserve, this approach may be considered after gaining input from the FRSAC.

Cultural Resource Management Guidelines:

[19] Available at: http://www.mass.gov/dfwele/dfw/habitat/cwcs/pdf/mass_cwcs_final.pdf
[20] Available at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/forestry/forestry_cmp.htm

A. As per DCR's regulatory responsibilities, any projects undertaken on DCR land must be reviewed during the planning stages by DCR's Office of Cultural Resources for their potential impacts to historic and archaeological resources.

B. Maintenance of historic buildings and structures within Reserves is allowed.

C. Vegetation management for the protection of historic or archaeological sites is allowed, with some restrictions on the time of year, types of equipment and techniques used to minimize resource disturbance, as guided by DCR Cultural Resources staff.

Facilities, Transportation and Boundary Guidelines:

A. No new roads will be constructed.

B. Existing roads not needed for recreation, administration or emergency use may be closed and restored to their natural condition, after consultation with local emergency management officials.

C. Existing roads will be managed and maintained to assure continued administrative and/or emergency access. Public roads within Reserves open to vehicles will be reviewed for vehicle closure via gating to enhance Reserve qualities after evaluation of impacts to fire and emergency vehicles, public access and after communication with local communities and the public.

D. Replacement of existing facilities, as needed, will be allowed, but construction of new facilities where none previously existed is prohibited. Exceptions may include small-scale, low impact, natural appearing informational kiosks, universal access structures for trails, composting toilets, trailheads, parking areas and carefully designed boardwalks, or other projects that protect the integrity of the reserve interior by locating those facilities that are necessary at the edge of the reserve.

E. Maintenance and marking of property boundaries is allowed.

F. All boundaries will be located and maintained on a ten-year cycle or when needed for project implementation. Maintain all boundaries clearly and in a way that is sensitive to adjacent private lands with visible residences.

G. Identify all boundaries needing formal surveys. All newly-acquired DCR properties should have their boundaries surveyed and marked. (Interior line boundaries should be obliterated.)

H. Survey boundaries needed for project implementation, where trespass is an issue, or where there are disputes.

Interpretation, Public Information, and Outreach Guidelines:

A. The balance between maintaining the values of an unimpeded experience and the need to address complex scientific concepts can be found through a combination of on-site public information (notices, rules signs, etc), interpretation (educational signage or programming), and outreach (off-site information sharing). To be consistent with the values of Reserves, on-site

media will need to harmonize with the environment and intrude on a visitor's experience only when necessary.

B. A minimalist approach to interpretation and public information is appropriate for Reserves. Outreach may be more important than on-site interpretation, and there will be opportunities to highlight ecological restoration.
   a) Interpretation in Reserves serves to prepare visitors for their experience in the Reserve. In the case of programming, it offers engaging educational opportunities.
   b) Public information provides orientation or notices about management or security issues.
   c) Outreach may be informational, interpretive, or educational. Its aim is to attract visitors or inform non-visitors of management rationale or activities.

C. Interpretation (programming and media) in Reserves should focus on the ecological services, support management goals, and be based on relevant interpretive plans.

D. Developed interpretive signage and public information are generally not appropriate within the Reserve and are most suited for main trailheads or parking areas.

E. Trails signs should follow "DCR Trails Guidelines and Best Practices Manual"[21] signage standards for primitive areas. Interpretive media should conform to DCR's graphic standards.

F. Infrastructure for interpretation may be added, however no new infrastructure should be applied within unless exceptional circumstances warrant otherwise.

Monitoring, Enforcement and Research Guidelines:

A. Non-destructive, low impact research for monitoring forest conditions may be conducted. In order to meet the intended purposes of Reserves, regular monitoring and research to document changing habitat conditions are needed. For example, monitoring information from Reserves will be critical in evaluating how climate change is affecting forest ecosystems and how species are adapting to this over time.

B. For each Reserve, DCR will seek a commitment to conduct regular monitoring from a non-profit conservation organization with the expertise to conduct monitoring.

C. Measure Continuous Forest Inventory plots on a regular cycle and use data in conjunction with ongoing research needs such as Reserve vegetation development, carbon storage and climate change.

D. Prior to conducting monitoring and research on Reserves, a proposal outlining the purpose of the research, the techniques used and the potential impacts on the land will be reviewed by the FRSAC and approved by DCR.

E. DCR acknowledges the need for active enforcement of prohibited activities (such as dumping of refuse, construction of illegal motorized or non-motorized trails, use of off-highway vehicles in

[21] *DCR Trails Guidelines and Best Practices Manual*, updated January 2010. Available at: http://www.mass.gov/dcr/stewardship/greenway/docs/DCR_guidelines.pdf

areas where not allowed, or cutting of trees at boundary encroachments) and regulated activities is critical to allow Reserves to develop under natural conditions without negative human impacts. However, DCR's current and historic level of resources does not allow for optimal enforcement, and joint or cooperative oversight is a long term goal.

Special Use Guidelines:

A. Special uses such as events and activities will be evaluated on an individual basis by DCR and may be allowed if they do not adversely impact and are compatible with the purposes of the Reserve. DCR's Special Use policy and guidelines apply. [22]

B. Existing special uses such as transmission lines, communication sites, and commercial uses that are not compatible with the intent of Reserves will be evaluated to determine if they can be relocated to another area.

C. Granting rights for new communications sites is prohibited. It should noted that such uses are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

D. Adding new communication hardware to existing fire towers and communications sites will be allowed, all applicable permits and DCR's Special Use policy and guidelines apply.

E. Commercial wind installations and commercial solar installations are prohibited. It should noted that such uses are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

F. Granting rights for new transmission lines is subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

G. Granting rights for new commercial uses is prohibited except to the extent necessary for activities that advance Reserve goals.

[22] Information about DCR's Special Use Permit program is available at http://www.mass.gov/dcr/permits/

Section 3: Parklands

DCR facilities offer an incredibly diverse mix of recreational opportunities, ranging from back country camping to urban swimming pools. Equally diverse are the size and character of properties on which these activities occur. As interests and recreational technologies change, the range of activities is expected to continue to evolve.

Although public recreation occurs on all DCR properties, for many, it's the agency's parks and other active recreational areas that are the main draw. These facilities accommodate millions of visitors each year. DCR's intent is to continue to provide the best possible recreational experiences at these facilities, most of which will be designated as Parklands.

3.1 Management Approach for Parklands

Many of the recreational opportunities and experiences offered by DCR are directly reliant upon the wide range of natural and cultural resources within the parks and forest system – without their protection and careful management, those opportunities and experiences would be lost. DCR is committed to continuing to provide a diverse range of recreation opportunities that are consistent with its goals for public safety, resource protection and management, public health, visitor education and enjoyment.

Management approach recommended by the Technical Steering Committee:

> *DCR should develop and implement management guidelines for Parklands that focus on enhancing recreation, while continuing to provide additional ecosystem services, including those identified for reserves as well as the aesthetic and cultural values of the property.*[23]

Ecosystem services provided by Parklands:

- protection of ecologically significant sites
- protection of cultural resources, and (once these resources are secure),
- provision of public outdoor recreational and environmental education opportunities

Recognizing that the focus of the FFVP was on DCR forestry practices, the TSC's primary guidance regarding Parklands management was that ". . . wood production is not a utilized ecosystem service in the parklands. Any cutting would be limited to what is necessary to support recreational assets and uses, including public safety."[24] However, DCR's adoption of the landscape designation system will encompass and guide all of the agency's operations, and as such, these guidelines propose that all management activities in Parklands should focus on maintaining or improving the recreational experiences of visitors.

3.2 Selection Criteria for Parklands

[23] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p.49

[24] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p.49

FFVP Recommended Allocation: 70,000 to 90,000 acres

GIS models based upon a continuum using the best available data were utilized to guide the selection of Parklands. The most favorable units of land for designation as Parklands are those that have:

- a high surrounding population density
- forested areas with high recreational values
- a high density of officially designated trails
- established recreational areas, such as campgrounds, golf courses, etc
- water access points for recreation
- active day use areas
- high recreational use/visitation
- easily accessible unique natural features: views, water features, chasms, unusual forest types
- unique historic/cultural features
- unique settings in comparison to the surrounding landscape
- suitable natural forested boundaries between active use areas and woodland areas

For these criteria, several existing internal and external data sets were used , including US Census data, DCR Roads and Trails data set, orthophotos, internally developed intensive use area and cultural resource inventory data.

3.3 Management Guidelines for Parklands

As properties that have the most recreational infrastructure and/or recreational uses, Parklands are likely also those areas that are assumed to have the highest levels of visitation. Attempting to protect and maintain areas that are heavily utilized can be a challenge. Overuse, can lead to competition for space, conflicts among different user groups, and damage to resources. However, popularity can also bring with it large and active friends groups and other potentially positive partnerships.

Parklands designation will ideally provide clear guidance on what can be done to protect the natural, cultural, and recreational resources that form the essence of a Parkland property.

Recreation and Public Access Guidelines:

A. A diverse mix of recreational activities will be allowed in the wide range of Parklands properties. While not all will be appropriate in every location, the range could include athletic field uses such as baseball and soccer, intensive uses such as swimming pools, downhill ski areas and golf courses and dispersed recreational activities such as motorized and non-motorized trail uses. Agency policies, resource protection, public safety, and recreational goals will continue to determine activities that are encouraged and/or allowed in individual properties.

B. Recreational uses should be consistent with DCR's determination for recreational demands and opportunities as assessed through planning efforts and tools such as the Recreation Opportunity Spectrum guidelines (see Appendix 3).

C. Development of new intensive-use sites within Parklands (e.g. campgrounds, athletic fields, playgrounds, picnic areas, visitor centers, administrative offices, parking lots, etc.) is allowed when consistent with public access, resource protection, public safety, and management goals.

D. DCR will strive to maintain a density and diversity of trails within Parklands that protects the natural and cultural resources of each property and meets the recreational intent for the property. Proposals for new trail development need to follow the existing process established through the "DCR Trails Guidelines and Best Practices Manual." Creating loop trails that enhance recreational experiences while supporting the other values of the Parklands will be encouraged.

Silviculture and Vegetation Management Guidelines:

A. Commercial production of wood for wood products or energy is not an objective in the Parklands. Vegetation management will only occur as needed to further the purposes of Parklands to protect ecologically significant sites and cultural resources and to provide environmental education and outdoor recreation opportunities in a natural and safe setting. Within these limited purposes, DCR will implement vegetation management in an effective and low impact manner, whether that be via hiring arboriculture firms (if budgets permit) or via bidding projects to arboriculture or forestry firms (at either no cost or small payment to DCR, which is incidental to the operation).

B. Forest habitat manipulation, vegetation management, silvicultural treatments and operations will be permitted for the following purposes:

   a) Vegetation management necessary to protect public health and safety, public interests, public assets and/or restore or maintain recreation sites following significant natural disturbances or insects or diseases.

   b) Vegetation management necessary for the control of non-native invasive plant species.

   c) Removal of plantations to restore more natural and diverse vegetative communities - if public health and safety are at risk or to restore ecologically significant communities such as pitch pine barrens. Controlled burns to maintain significant natural communities such as pine barrens is allowed with close coordination with municipal fire and safety, local Friends groups and the general public.

   d) Vegetation management necessary to control erosion, stabilize soils, or to close unauthorized trails or roads not needed for administrative or emergency purposes. (Local emergency officials will be consulted in all road closures.)

   e) Vegetation management necessary for the development or maintenance of trails, recreation area aesthetics and existing roads.

   f) Vegetation management necessary to create or maintain agricultural fields, lawns, turf, greens or scenic vistas associated with recreational or educational goals.

C. Vegetation management mandated by environmental regulatory requirements.

D. Hazardous trees or excessive fuel loads that pose significant risk to public safety may be removed.

E. Vegetation management is permitted by parties who have pre-existing legal rights (e.g., Easement holders, utility easements) to perform such activity, subject, however, to standard regulatory and permitting requirements.

Water and Soil Resource Guidelines:

A. Management may be permitted to control erosion or stabilize soils, by closing roads and unauthorized trails, or other means such as stabilizing slopes with water bars or other erosion control structures. Local emergency management officials will be consulted for any road closures being considered.

B. Where DCR Parklands occur on local or regional public water supply watersheds, appropriate management activities may be undertaken (after consultation with the public water supplier and/or DEP) to address water quality protection issues (e.g., due to wildfires, insect or disease outbreaks, or other unanticipated threats to water quality.) See Appendix 2 for a map and list of DCR properties on public water supply watersheds.

Habitat Protection Guidelines:

A. Vegetation management necessary to comply with Natural Heritage and Endangered Species Program recommendations for the restoration, maintenance or enhancement of habitats for rare and endangered species and exemplary natural or rare communities may be allowed.

B. Vegetation management to support species of greatest conservation need (SGCN) as described in the Massachusetts Comprehensive Wildlife Conservation Strategy may be allowed if a particular SGCN is historically and or culturally associated with a specific Parkland.

C. Identification, documentation and protection of rare species occurrences and important habitats will be addressed using the following tools:
    a. Review of the Massachusetts Natural Heritage and Endangered Species Program (NHESP) GIS database, which includes datalayers from statewide databases such as BioMap2, Living Waters, Priority Habitats of rare species, Estimated Habitats of rare wildlife, Certified or Potential Vernal Pools, and Natural Communities.
    b. Review of and consultation with other sources of natural resource information, where appropriate and available (e.g., Mass Audubon, New England Wildflower Society, The Vernal Pool Association and other NGOs, local naturalists, etc.)
    c. Surveys and monitoring (for project specific purposes or long-term documentation), by trained DCR staff and/or outside consultants, to document and map rare species and important habitats when necessary.
    d. If any state listed species are listed pursuant to the U.S. Endangered Species Act (16 U.S.C.A. §§ 1531 – 1544) the US Fish & Wildlife Service must approve the project and the appropriate species Recovery Plan shall be consulted.

e. Consider certifying potential vernal pools if applicable; apply accepted Massachusetts and federal protection guidelines around all certified or potential vernal pools (304 CMR 11.00).

D. DCR will work closely with the Massachusetts Division of Fisheries & Wildlife (DFW), and consult the Comprehensive Wildlife Conservation Strategy (CWCS)[25] for guidance in protecting rare species and their habitats, and the Forestry Conservation Management Practices for Rare Species,[26] where appropriate.

E. DCR will work closely with DFW to resolve conflicts between wildlife and park facilities (such as beaver flooding problems).

F. Using the resources available from the NHESP, Habitat Restoration Plans should be generated to improve degraded habitats important to rare species and/or state/regional biodiversity.

G. DCR will consult with DFW and the Massachusetts Department of Environmental Protection (DEP) prior to conducting any work adjacent to Coldwater Fisheries habitats; apply protection guidelines recommended.

H. Partnerships with Friends groups, local naturalists, environmental organizations, etc., will be formed to assist in the identification, protection and monitoring of important habitats or rare species population, where appropriate.

Forest Health and Protection Guidelines:

A. Spread of major significant forest pathogens and invasive species (such as Asian Longhorned Beetle or Emerald Ash Borer) may be controlled if there is a major threat to forest health or risk to private or public interests.

B. Pesticide use will be allowed in limited situations for the removal of invasives, only when no other feasible alternatives are available. Removal of invasives to provide the public with examples of native vegetation and habitats and as demonstration projects for other lands and to protect the integrity of the environmentally significant sites represented within the Parklands.

C. Wildfires will be contained, controlled and suppressed unless there is an approved site specific controlled fire plan and conditions are within the fire plan prescription.

D. Fire breaks may be maintained.

E. Prescribed fire may be used when it is compatible with protection of the property, restoration of native communities and ecological processes and the protection of life and property in the Parkland and surrounding landscape. The fire burn plan would be subject to the review of the local fire chief(s).

Cultural Resource Management Guidelines:

[25] Available at: http://www.mass.gov/dfwele/dfw/habitat/cwcs/pdf/mass_cwcs_final.pdf
[26] Available at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/forestry/forestry_cmp.htm

A. As per DCR's regulatory responsibilities, any projects undertaken on DCR land must be reviewed by DCR's Office of Cultural Resources during the planning stages for their potential impacts to historic and archaeological resources.

B. Maintenance of historic buildings, structures and landscapes within Parklands is allowed.

C. Vegetation management for the protection of historic or archaeological sites is allowed, with some restrictions on the time of year, types of equipment and techniques used to minimize resource disturbance, as guided by the DCR's cultural resources staff.

Facilities, Transportation and Boundary Guidelines:

A. New roads necessary for public, administrative and emergency use may be constructed after review for impacts to natural and cultural resources.

B. Existing roads not needed for recreation, administration or emergency use may be closed and restored to their natural condition, after consultation with local emergency management officials.

C. Existing roads will be managed and maintained according to either the DCR *Historic Parkways Preservation Treatment Guidelines* [27] where appropriate, or other applicable road standards to assure continued access.

D. Construction of new facilities may occur as necessary for public and administrative use after review of impacts to natural and cultural resources.

E. Maintenance and marking of property boundaries is allowed.

F. All boundaries will be located and maintained on a ten-year cycle or when needed for project implementation. Maintain all boundaries clearly and in a way that is sensitive to adjacent private lands with visible residences.

G. Identify all boundaries needing formal surveys. All newly-acquired DCR properties should have their boundaries surveyed and marked. (Interior line boundaries should be obliterated.)

H. Survey boundaries needed for project implementation, where trespass is an issue, or where there are disputes.

Interpretation, Public Information, and Outreach Guidelines:

A. The combination of existing infrastructure, natural and cultural features, and the readiness of an audience in parklands creates a strong opportunity to connect with visitors. Therefore, formal programming and media are appropriate in Parklands.

a) Interpretation in Parklands builds emotional and intellectual connections between visitors and the resource.

[27] *Historic Parkways Preservation Treatment Guidelines* are available at: http://www.mass.gov/dcr/histpark.htm

b) Public information in Parklands provides orientation, wayfinding, and notices about management activities or security issues.

c) Outreach may be informational, interpretive, or educational with the aim of attracting visitors or informing non-visitors of park activities and opportunities.

B. Interpretation (programming and media) in Parklands is based on the natural, cultural, and recreational themes of the property, supports management goals, and is based on relevant interpretive plans.

C. Informational signs and interpretive kiosks are appropriate for siting throughout Parklands in a manner consistent with the character of the facility.

D. Trails signs should follow "DCR Trails Guidelines and Best Practices Manual" signage standards. Interpretive media should conform to DCR's graphic guidelines.

E. Interpretation in Parklands may take advantage of existing resources and infrastructure or may initiate new infrastructure to enhance interpretive opportunities.

Monitoring, Enforcement and Research Guidelines:

A. Monitoring and research projects may be conducted as approved through the Special Use Permit process.

B. Active enforcement of prohibited or regulated activities, such as dumping of refuse, construction of illegal motorized or non-motorized trails, use of off-highway vehicles in areas where not allowed, is critical to the maintenance of resources within Parklands.

C. Measure Continuous Forest Inventory plots on a regular cycle and use data in conjunction with ongoing research needs such as Reserve vegetation development, carbon storage and climate change.

Special Use Guidelines:

A. Special uses such as events and activities are allowed and will be evaluated on an individual basis as provided in DCR Special Use Policies and Procedures.[28]

B. Granting rights for new communications sites must be compatible with resource protection, recreational, public safety and aesthetic goals of Parklands, and not adversely impact the visitor's experience. Such rights are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply. Adding new communication hardware to existing fire towers and communications sites will be allowed, all applicable permits and DCR's Special Use policy and guidelines apply.

C. Commercial wind installations and commercial solar installations are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such

[28] Information about DCR's Special Use Permit program is available at http://www.mass.gov/dcr/permits/

circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

D. Granting rights for new transmission lines is subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.
E. Granting rights for new commercial uses is prohibited except to the extent necessary for activities that advance Parklands goals (example: food concessions associated with beaches).

Section 4: Woodlands

The forestlands of Massachusetts represent one of its finest natural assets, and the questions and issues regarding the management of the forests under the care and control of DCR were at the heart of the questions that brought about the FFVP. In designating approximately 40% of those lands as Woodlands, DCR's intent is to assure the long-term protection and sustainable use of this valuable resource for the wide range of values, benefits and uses that it provides.

4.1 Management Approach for Woodlands

The emphasis of forest management in Woodlands will be to provide the range of ecosystem services that sustainably-managed forestlands offer, as well as educational examples of excellent forestry to landowners and the general public. Forestry practices will be directed at protecting forest productivity through sustainable forestry, providing resilience in watershed forests through active management, managing conditions to promote late forest successional structure and early forest successional stages,, and producing high quality, high value, local forest products. Forest management will also play a role in the ecological restoration of areas that have been significantly altered by past land use and management practices such as plantations of non-native species and high-grading.

Management approach recommended by the Technical Steering Committee:

> *DCR should develop and implement management guidelines for Woodlands that demonstrate excellent forest management practices for sustainable production of wood, restoration of late successional habitat, active management of drinking water quantity and quality, creation of early successional habitat, and promotion of carbon sequestration and any other ecosystem services that benefit from relatively active manipulation of the forest. Over time, these guidelines should promote a greater emphasis on uneven-aged forests across the DCR system. At the same time, woodlands management should include guidelines to protect rare species habitat and other natural resources, as well as the integrity and scenic quality of trails and scenic roads in the woodlands zone.*[29]

Ecosystem Services provided by Woodlands:

- protection of forest productivity with state of the art sustainable forestry
- restoration of late successional habitat
- protection of water supplies by increasing resilience and resistance of forests
- carbon sequestration through retention of woody debris and legacy trees in all silvicultural treatments including late successional habitat restoration
- ecological restoration of degraded natural community types (e.g., pitch pine/scrub oak barrens where human fire exclusion has led to excessive build-up of volatile fuels) and past high-graded stands.
- sustainable production of renewable wood products including fuelwood and high quality timber for local markets
- provision of early-successional habitat that is otherwise limited by human development.

[29] *Final Report - Forest Futures Visioning Process Recommendations of the Technical Steering Committee*. April 21, 2010, p. 52.

Foresters, the primary stewards of the actively managed woodlands, must always be fully cognizant of their crucial role in prescribing forest vegetation management strategies on public lands. Forest managers will always be conscious that DCR Woodlands also serve as demonstration forests. In order to achieve the high standard of forestry desired, DCR foresters will be licensed, maintain pertinent continuing forestry education, and use other expertise to learn state of the art forestry techniques. DCR foresters must strive to demonstrate and document as many of the following concepts within the forest management prescription as appropriate, and implement them in the field.

- Excellent silviculture conceptually and in practice. Prescriptions shall demonstrate how the treatment fits the regional forest type and the ecosystem processes that are present. The implementation of the prescriptions will use appropriate logging systems and equipment and demonstrate knowledgeable approaches to forestry aesthetics, i.e. a consideration of how the forestry practice looks to the general public.
- Sustainable forestry practices, biologically and economically.
- Positive benefits to wildlife.
- Model forestry on DCR lands that are a part of municipal watersheds utilizing silviculture and Best Management Practices (BMPs) developed by the DCR Division of Water Supply Protection.[30]
- Benefits to local economies (payments to towns through the Forest Products Trust Fund) and the Commonwealth using locally grown and harvested wood products.
- Opportunities to contribute to DCR's recreational goals.
- Opportunities to restore and maintain structural diversity in forests including late successional forest habitat and early successional habitat on both the stand and landscape level.

4.2 Selection Criteria for Woodlands

FFVP Recommended allocation: 100,000 to 150,000 acres

GIS models are based upon existing digital data and produce output that results in a continuum of values designed to assist with the process of zoning or land allocation. The most favorable units of land for designation as Woodlands are those:

1. areas suitable for wood production based on soils, vegetation, distance from roads and past management
2. sites with a history of recent silvicultural treatments
3. areas where late successional characteristics could be restored via management
4. areas that currently have low forest type diversity
5. areas where the potential impact on communities the most dependent on the local forest economy is the greatest
6. areas suitable for early successional habitat creation
7. sites requiring ecological restoration or those prone to disturbance
8. watershed areas that would benefit from active forest manipulation
9. areas in closest proximity to wood processing facilities

[30] See: http://www.mass.gov/dcr/watersupply/watershed/quablmp.htm

10. areas where forest management could increase carbon storage
11. areas with good access for model forest demonstration activities
12. suitability of site as a representative of forest type, age class and logging conditions for demonstration purposes

For these criteria, sixteen different datasets were used and/or created to identify and classify lands best suited for Woodland landscape designation. The goal was to use the best data currently available and the best data we could develop to identify Woodlands. For example, to identify areas most suitable for wood production, the existing "Prime Forest Soils" and "Past Management" datasets were used as well as the newly created "Vegetation Suitability" and "Distance from Roads" datasets. To assess the positive impacts on communities most dependent on the local forest economy, a "Distance to Sawmills" dataset was created (based on sawmill locations identified in January of 2010 by a UMass study) and were used along with the existing "Sawmill Woodsheds" and "Harvester Woodsheds" dataset (also from UMass researchers). Ultimately, all of these datasets were added together (for TSC criteria that used more than one dataset, the multiple datasets were added together and rescaled so that each of the twelve TSC criteria were weighted evenly) to come up with a ranking of DCR land that quantifies their relative value as Woodlands.

Further categorization of Woodlands is necessary to achieve the goals for this zone, and it will be done on the level of forest stands, as discussed below. (Appendix 4 has additional information on this process.)

4.3 Assessment and Classification of Forest Stands

The primary goal in the assessment of forest stands is to match forest productivity and condition with broad silvicultural regimes. Note that the guidelines and directions here are at a broad landscape level - each site or stand considered for treatment must also be evaluated at ground level resolution.

Existing FRMPs will be evaluated, updated and expanded to include an assessment and classification of site quality and productivity. All future FRMPs will also incorporate this assessment and classification exercise. The existing FRMPs used the Priority Timber Harvest Model[31], developed by DCR staff, which produced silvicultural options in Active Management Areas based on forest type, stocking levels and size classes. Forest type, stocking levels, and size class were determined from aerial photographs taken and interpreted in 2003 – this data is known as the Bureau of Forestry Land Cover Classification.[32]

The TSC Report recommends classifying forest stands based on land use history and forest development as represented through origin, age and condition of stands. Generally, the classifications would depend on whether these lands were cut and cultivated, cut and pastured – not cultivated, or always woodland. The classifications suggested in the TSC Report are **Primary, Secondary, and Tertiary** forests. Unfortunately, there is not consistent, accurate statewide data to provide a strong evaluation of primary, secondary and tertiary forests on Woodlands as defined in the TSC Report.

[31] A GIS model developed by DCR staff that utilized district specific statistics to identify and prioritize areas for active forest management.

[32] This data was created by James Sewell Co., Inc. for the Land Cover Classification project

The guidelines developed here will observe the spirit and intent of the TSC Report by proposing a classification scheme that will reflect the current land condition, development stage and productivity based on vegetation mapping and forest inventory data. The recommendation from the TSC carries with it the inherent message that more productive, more complex forest conditions will require more complex silviculture.

Forests with species composition, size classes and densities that indicate early stages of succession and conversely mid and later successional stages in forest development will be ranked or classed accordingly. Site productivity ratings (e.g. site index, prime soils analysis) will further refine the classification process.

Data sets that are available for classifying forest stands are:

- The Bureau of Forestry Land Cover Classification produced by James Sewell Inc.
- The Prime Soils data layer produced by the University of Massachusetts
- Massachusetts Continuous Forest Inventory data.

Forest stands will be classed on a continuum and considered for three different levels of silviculture (Table 1). Silvicultural Level One will be used for non-timber objectives or protection of significant biological or cultural resources. Silvicultural Levels Two and Three will actively use a variety of silvicultural tools to provide a suite of ecosystem services. (The Silviculture and Vegetation Management Guidelines, below, provide additional information and definitions for these three different levels of silviculture.) Forests that are plantations, or are developing from recent agricultural use (approximately the last 60 years) and are composed of species indicative of young forest and recent regeneration (Birch-Red Maple, White Pine) and are on lower productivity sites will rank low on the continuum of condition and productivity. Stands that are composed of species that indicate higher levels of natural disturbance such as Pitch Pine and Scrub Oak, and those particularly on lower productivity sites also will rank low on the classification continuum.

As forest stands increase in species diversity, vertical and horizontal structure, size, age, and site productivity, they will rank higher on the classification continuum and be examined for Level Two Silviculture. In general, the more productive forest stands (i.e., those that are higher on the classification continuum) will receive Level Two silviculture. Less productive stands (lower on the continuum) will be considered for Level Three silviculture.

Table 1. Silvicultural levels for managed Woodland stands.

Silvicultural Level	Description	Application Criteria
Level 1	Timber production not an objective. Harvesting often excluded or deferred.	Protection of significant biological or cultural resources.
Level 2	Uneven age management - Create and enhance late successional habitat. Enhance vertical structure, multiple age classes, tree species diversity and large tree size classes.	Stand and site conditions that are generally more complex or have the potential to be managed for increased complexity.
Level 3	Even age management and uneven age management – Enhance diversity in	Stands that are less productive and less structurally diverse - generally

	damaged and even age stands. Create and maintain early successional and young forest conditions.	even aged and on less developed, less complex soils

4.4 Management Guidelines for Woodlands

Recreation and Public Access Guidelines:

A. The most common types of recreation in woodlands will include dispersed recreational uses such as hiking, mountain biking, hunting, fishing, horseback riding, primitive camping, snowmobiling, and off highway vehicle use (where compliant with DCR OHV siting criteria). Property specific regulations and policies apply.

B. DCR will strive to maintain a moderate to low density and diversity of trails within woodlands that protects the objectives of each property as well as the recreational intent. Proposals for new trail development will be evaluated through process established in the "DCR Trails Guidelines and Best Practices Manual." Creating loop trails that enhance recreational experiences while supporting the other values of the Woodlands will be encouraged. Creating small vistas along trails would be allowed.

C. Hazardous trees within a "tree length" distance from trails, parking areas, and access roads that pose significant risk to public safety, may be cut.

D. Forestry practices that can support recreational values within Woodlands will be incorporated, where feasible and shall be designed to promote aesthetics, native vegetation, species diversity, large diameter older trees, multiple age classes, and a safe recreational experience in recreation areas and at public access points. (See also Appendix 4 – Recreation and Forestry)

E. During timber sale activities, logging equipment will be used to control erosion or stabilize soils, by closing trails and roads not needed for administrative or emergency access. Local emergency management officials will be consulted prior to closing or restricting use of permanent roads to ensure that access for emergency purposes is maintained

F. Where OHV's are prohibited, roads and trails for harvesting will be closed and stabilized, where they will not be used for other activities. However, where OHV's are allowed, foresters will consider whether existing access for OHV's can be improved via roads and trails used to access the harvest site (by replacing poorly planned trails, stabilizing well located trails etc.).

G. Special attention and care will be given to provide long-term quality scenery, general property aesthetic considerations and improve vistas where possible and appropriate.

Silviculture and Vegetation Management Guidelines:

A. DCR Foresters will coordinate with the Management Program Supervisor, and the DCR Park Operations staff, as well as with user groups, when vegetation management is planned. (This process is outlined in the Interpretation and Outreach section of Appendix 4.)

B. Silvicultural treatments should generally promote native, diverse, healthy forests and habitats. To accomplish this, Woodlands might receive treatment in one of three intensity levels. (The following is a summary - for complete guidelines for treatment, timber sales, and recreation considerations, please see Appendix 4.)

   a) **Silviculture Level One** – Intended for the protection of ecologically or culturally significant areas within woodlands, producing timber crops is not an objective. Commercial harvests are excluded or deferred. Not harvesting timber will most often be the Level One silvicultural choice. Cutting that does occur at Level One will be for site specific purposes such as third party easement maintenance, controlling the spread of invasive pathogens, insects or plants, removing hazardous trees along trails, vegetation management for cultural resource protection , or promoting habitat for rare and endangered species. Reasons for choosing to exclude harvest at Level One include wetlands and vernal pools, rare species habitat and communities, areas of historical and cultural significance, old growth forests, riparian and trail buffers, or steep slopes.

   b) **Silviculture Level Two** – Forestry performed at this level will be used to create and enhance vertical structure, multiple age classes, tree species diversity and large tree size classes. This level of silviculture will be used to restore late-successional forest structure and characteristics. Where sites are best suited for this silvicultural approach, such as areas adjacent to Reserves or existing high quality late successional stands, trees will be retained to older ages and more downed woody debris will be retained. Those forest stands that have the immediate potential for significant diversity and are rated high from a productivity standpoint will be treated with silviculture that enhances diversity and protects productivity. Greater emphasis will be given to Level Two silviculture over Level Three silviculture when weighing options for managing forest stands.

   c) **Silviculture Level Three –** Forest management practiced at this level will work with those stands that are less productive and less structurally diverse. The stands treated with this level are generally even aged and /or on less complex soils. Silviculture at this level will work to add diversity to high graded or lower productivity stands. Commissioner approval will be required for openings greater than 1/3 acre designed to harvest all merchantable trees. Overall, there will be less emphasis on Level Three Silviculture, particularly those practices that will result in large harvest openings.

C. Plantation forests may be harvested or removed within any of the Silvicultural Levels to achieve results described above. Their harvesting or removal will be constrained relative to the Silviculture Level and the guidelines established in this document (i.e., size of openings, review processes).

D. Small harvests of standing live or dead or down dead trees, commonly referred to as “Home Fuelwood” will be allowed for sale to individual citizens. Home Fuelwood harvests can occur within any of the Silvicultural Levels to achieve results described for the respective levels. Home Fuelwood harvests will be constrained relative to the Silviculture Level and the guidelines established in this document (i.e., review processes). DCR will continue and expand the current program to help meet the forest management goals within small portions of Woodlands while

engaging the public and providing a local market for low quality wood from improvement cuttings. DCR will also strive to include low income families by working with the state's low income fuel assistance programs, where feasible and look to provide wood on landings where access into the woods is less feasible.

Water and Soil Resource Guidelines:

A. Manage areas around all vernal pools (certified and non-certified) according to the Massachusetts Forestry Best Management Practices Manual[33] (BMPs) and further directed by "Guidelines for Timber Harvesting near Vernal Pools".[34]

B. Maintain soil processes by providing for the recruitment of organic inputs (retain coarse woody debris) and minimizing erosion through the use of BMPs.

C. Minimize the number of roads, skid trails, and landings.

D. Require that landings and main skid roads be stabilized, graded, and planted to appropriate native seed mixtures at the end of any operation.

E. A petrochemical spill management plan will be in place on all districts where active forest management activities take place.

F. Require that all petroleum products, industrial chemicals, and hazardous materials must be stored in accordance with manufacturer's specifications, and at a minimum in durable sealed containers.

G. Require that all harvesting machinery carry oil absorbent cloth, shovel and 5-gallon bucket to mitigate any oil or hydraulic fluid leaks, and that any such leaks/ spills be reported to the appropriate Management Forester (and to DEP, if appropriate) on the day they occur.

H. Require that all harvesting machinery be thoroughly cleaned of mud and other debris before entering DCR lands to minimize the introduction of invasive plant seeds and parts.

I. Prohibit the use of harvesting machinery during the typical mud season (March 15 to May 15) or wet periods, unless waived by the forester.

J. Protect highly sensitive or wet soils by limiting activities to the period when the ground is frozen or dry to prevent a reduction in site productivity and/or requiring equipment that minimizes impacts to these soils.

K. Manage soils on a sustainable basis by minimizing erosion, compaction and displacement. Management is permitted to control erosion or stabilize soils, by closing roads and unauthorized trails, or other means such as stabilizing slopes with water bars or other erosion control structures. Local emergency management officials will be consulted in any road closures.

[33] Kittredge, David B. and Michael Parker. *Massachusetts Forestry Best Management Practices Manual.* 1999. Prepared for the Massachusetts Dept of Environmental Protection, Office of Watershed Management and the US Environmental Protection Agency, Region 1, Water Division.

[34] Unpublished Document. Guidelines for Timber Harvesting Near Vernal Pools. Distributed by Massachusetts Department of Conservation. 2pp.

L. Where Woodlands overlap with DWSP lands, local or regional public water supply lands, management should be closely coordinated with the public water supply agency to address water quality protection issues.

Habitat Protection Guidelines:

A. Vegetation management necessary to comply with NHESP recommendations for the restoration, maintenance or enhancement of habitats for rare and endangered species and exemplary natural or rare communities may be allowed.

B. Vegetation management to support species of greatest conservation need (SGCN) as described in the Massachusetts Wildlife Action Plan may be allowed if a particular SGCN is historically and or culturally associated with a specific Woodland, and if a public process verifies support for such management prior to it being carried out.

C. Identification, documentation and protection of rare species occurrences and important habitats will be addressed using the following tools:

   a. Review of the NHESP GIS database, which includes datalayers from statewide databases such as BioMap2, Priority Habitats of rare species, Estimated Habitats of rare wildlife, Certified or Potential Vernal Pools, and Natural Communities.
   b. Review of and consultation with other sources of natural resource information, where appropriate and available (e.g., Mass Audubon, New England Wildflower Society, The Vernal Pool Association and other NGOs, local naturalists, etc.) Surveys and monitoring (for project specific purposes or long-term documentation), by trained DCR staff and/or outside consultants, to document and map rare species and important habitats.
   c. DCR will work closely with the Massachusetts Division of Fisheries & Wildlife and consult the Comprehensive Wildlife Conservation Strategy for guidance in protecting rare species and their habitats, and the Forestry Conservation Management Practices for Rare Species,[35] where appropriate.
   d. If any state listed species are listed pursuant to the U.S. Endangered Species Act (16 U.S.C.A. §§ 1531 – 1544) the US Fish & Wildlife Service must approve the project and the appropriate species Recovery Plan shall be consulted.
   e. Consult and work with NHESP to identify and develop appropriate conservation practices for Natural Communities.
   f. Wetlands and vernal pools will be mapped and documented. Treat all vernal pools as certified. Submit potential vernal pools for certification if applicable; apply accepted Massachusetts and federal protection guidelines around all certified or potential vernal pools (304 CMR 11.00).

D. Using the resources noted in section A, Habitat Restoration Plans should be generated to improve degraded habitats important to rare species and/or state/regional biodiversity.

[35] Available at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/forestry/forestry_cmp.htm

E. Consult with DFW and the MA Department of Environmental Protection (DEP) prior to conducting any work adjacent to Coldwater Fisheries habitats; apply protection guidelines recommended.
F. Form partnerships with Friends groups, local naturalists, environmental organizations, etc., to assist in the identification, protection and monitoring of important habitats or rare species population where appropriate.

Forest Health and Protection Guidelines:

A. Forest Insects and Diseases

a) Conduct periodic surveys to identify and quantify forest insect and disease impacts.
b) Prescribe integrated pest management approaches that treat high-risk stands, including the development of an Invasive Species Response Plan for invasive species of significant risk to forest resources.
c) Implement the draft Massachusetts Highly Destructive Forest Invasive Species Response Plan[36] for invasive species that pose a significant risk to forest resources.

B. Non-native Invasive Species

a) Conduct periodic surveys to identify, map, and quantify impacts of non-native invasive species.

b) Prescribe integrated and interdisciplinary approaches that treat existing populations while maintaining desirable native species. Integrate the removal of invasives as a requirement of timber sale contractual operations.
c) Take reasonable preventative measures during projects to limit the spread of existing populations and the introduction of new populations, including inspection of all equipment prior to unloading at the job sites. If the Management Forester feels there is a threat of introduction of plant parts or seed, the operator will be required to thoroughly clean the exterior, undercarriage, and tires/tracks of all equipment with a high-pressure washer at a maintenance facility prior to bringing the equipment on site.

C. Carbon sequestration

a) Manage for native vigorous vegetative growth that will both increase carbon storage and enable adaptation to climate change over time. For example, use uneven aged silvicultural systems to regenerate northern hardwoods to help maintain this forest type which is at high risk of decline in the future due to climate change.
b) Use extended rotations and forest management techniques to restore late successional forest structure.
c) Draw upon and utilize the most current research and science in applying forest management carbon sequestration strategies.

D. Use of Pesticides

[36] See http://www.mass.gov/dcr/stewardship/forestry/docs/response_plan_invasive.pdf

a) Use pesticides only when there are no other practical alternatives.
b) Apply pesticides according to product labels and by a licensed applicator.
c) Monitor treatments for effectiveness and impacts on non-target species and areas.

E. Salvage of Dead and Dying Forest

a) Use salvage operations following standard operating forest management guidelines and Best Management Practices[37] to reduce risk to human health and safety, of fire, or to reduce continued forest health threats, when necessary.
b) Consider pre-salvage operations to reduce risk to human health and safety, or address forest health threats.

F. Fire

a) Inventory and maintain desirable fire roads and water drafting sites.
b) Meet Massachusetts slash law requirements.
c) Suppress wildfires to meet the following objectives:
    i) Provide for the safety and well being of fire fighters and the public.
    ii) Protect natural resource investments and private property.
    iii) Use minimal impact suppression tactics (MIST) in fire pre-suppression and suppression actions.
    iv) Coordinate suppression tactics with the natural resource desired conditions.
d) Use mechanical treatments such as fire breaks and mowing and prescribed fire to:
    i) maintain natural communities
    ii) reduce the buildup of hazardous fuels and catastrophic wildfire
    iii) enhance conditions favorable to rare species or communities
    iv) establish desirable regeneration
    v) create habitat for early successional species.
e) Maintain forest health to reduce forest mortality and subsequent build-up of fuels.

Cultural Resource Management Guidelines:

A. As per DCR's regulatory responsibilities, any projects undertaken on DCR land – including forestry cutting plans or other silvicultural prescriptions - must first be reviewed during the planning stage by DCR's Office of Cultural Resources (OCR) for potential impacts to known and potential historic and archaeological sites.

B. Vegetation management for the protection of historic or archaeological sites is allowed, with some restrictions on the time of year, types of equipment and techniques used to minimize resource disturbance, as guided by the DCR's cultural resources staff.

C. When designing a harvest, every effort should be made to identify pathways for equipment that avoid the creation of new (or widening existing) gaps in stone walls. If stone walls are within potential treatment areas, a site walk with OCR staff to review options and assess potential

[37] Kittredge, David B. and Michael Parker. *Massachusetts Forestry Best Management Practices Manual.* 1999. Prepared for the Massachusetts Dept of Environmental Protection, Office of Watershed Management and the US Environmental Protection Agency, Region 1, Water Division.

impacts and mitigation measures should take place during prescription and/or cutting plan development.

D. Upon completion of a vegetation management treatment, all slash will be removed from within any foundation or cellar hole.

E. Maintenance of historic buildings, structures, sites and landscapes within Woodlands is allowed.

Facilities, Transportation and Boundary Guidelines:

A. Roads

a) Minimize the number of truck roads, skid trails and landings.
b) Staging areas, landings, main skid trails and truck roads must be stabilized and graded at the end of any operation.
c) Protect highly sensitive or wet soils by limiting activities to periods when the ground is frozen or dry, and/or requiring equipment that minimizes impacts to these soils. Use of harvesting machinery during the typical mud season (March 15 to May 15) or wet periods should be prohibited, unless waived by the forester due to drier than normal conditions.
d) New truck road construction permitted in stable areas only when necessary.
e) Commercial timber management, including salvage, is allowed within road corridors, and will be designed to promote diverse native vegetation, large-diameter trees, multiple age classes and forest structures, healthy forest, safe recreation experience, and quality scenery.
f) No slash should remain within 25 feet of roads.
g) Skid trails and truck roads will be carefully laid out by the forester considering grades, drainage and stream integrity.
h) Inventory and maintain desirable fire roads and water drafting sites.
i) Minimize truck road width.
j) Minimize road shoulder clearing width for safe passage and provide minimal necessary fire breaks.
k) Minimize adverse effects on wildlife migration through properly designed and maintained roads and structures (cut and fill banks, culverts, and ditches).
l) Maintain roads in accordance with established road classification systems and maintenance policy.
m) Consider the use of in-kind services to provide for skid trail and truck road maintenance during project planning and implementation.
n) Coordinate and cooperate with municipal officials on the management of roads and ownership of timber within road right-of-ways.
o) Permanently close (restore to natural condition) roads that are significantly degraded, cannot be economically repaired or serve no feasible use.
p) Temporarily close forest roads, using barriers and gates, which will be used minimally for administrative needs only. Local emergency management officials will be consulted.

B. Boundaries

a) Identify all boundaries needing formal surveys. All newly-acquired DCR properties should have their boundaries surveyed and marked. (Interior line boundaries should be discontinued.)
b) Survey boundaries needed for project implementation, where trespass is an issue, or where there are disputes.
c) All boundaries will be located and maintained on a 10 year cycle or when needed for project implementation.
d) Maintain all boundaries clearly and in a way that is sensitive to adjacent private lands with visible residences.

C. Facilities

Construction of new facilities may occur as necessary for public and administrative use.

Interpretation, Public Information, and Outreach Guidelines:

A. Reaching the management goals in Woodlands depends on the community trust and support that can be gained through effective communication. Interpretation supports management objectives and is based on relevant interpretive and forest management plans. Interpretation, public information, and outreach are necessary in order to be fully successful in creating demonstration model forests. Therefore, public programs around ongoing forest management in Woodlands will be a high priority for the DCR environmental education program.

a) Interpretation helps develop an awareness and understanding of a place. In Woodlands it will focus on forest management practices and the ecosystems services the land provides.

b) Public information in Woodlands provides orientation or notices about management activities, forestry activities, and security issues.

c) Outreach provides information to constituents who may or may not be Woodland visitors. Intense efforts will be made to extend outreach in conjunction with forest management projects.

d) The current Public Outreach and Consultation Policy found at http://www.mass.gov/dcr/stewardship/forestry/docs/ is scheduled to be evaluated and updated in Spring 2011. Amendments will include a public site visit each proposed timber sale project as opposed to only those “Projects that have high public sensitivity” as called for in the current policy.

B. Interpretation (programming and media) in woodlands is based on the themes of the land and the past harvesting projects that have taken place. It is vitally important to interpret the dynamics of forest ecosystems, with and without human intervention.

C. Interpretive media (e.g. pamphlets and brochures) or programming regarding management activities will be made available at state forests and parks, in neighboring communities, and via the internet.

D. Informational signs and interpretive kiosks are most appropriate at main trailheads or parking areas, demonstration forests, and active management sites. Minimal developed interpretive signage is appropriate elsewhere within the woodlands.

E. Trails signs should follow "DCR Trails Guidelines and Best Practices Manual" signage standards for primitive areas. Interpretive media should conform to DCRs graphic guidelines.

F. Interpretation and public information may require new infrastructure.

Monitoring, Enforcement and Research Guidelines:

A. Monitoring and research projects may be conducted as approved through the Special Use Permit process.

B. Measure Continuous Forest Inventory plots on a regular cycle and use data in conjunction with ongoing research needs such as Reserve vegetation development, carbon storage and climate change.

C. All stands that have received silvicultural treatment will be inventoried within five years of the completed treatment using the stand level inventory system used to assess the stands prior to treatment. Post treatment stand exam/monitoring will measure the same attributes so as to track the results of the forest management objectives.

D. Active enforcement of prohibited or regulated activities (such as unapproved trails or cutting of trees at boundary encroachments) is critical to maintain resources within Woodlands.

Special Use Guidelines:

A. Special uses such as events and activities are allowed and will be evaluated on an individual basis as provided in DCR Special Use Policies and Procedures. [38]

B. Research areas are managed under special-use permits and cooperative partnerships are encouraged to further collective knowledge of ecosystem functions and processes.

C. Existing special uses such as transmission lines and communication sites that are not compatible with Woodlands uses and resource protection may be evaluated to determine if they can be relocated to another area.

D. Granting rights for new communications sites must be compatible with resource protection and management, recreational, public safety and aesthetic goals of woodlands, and not adversely impact the visitor's experience. Such rights are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply. Adding new communication hardware to existing fire towers and communications sites will be allowed, all applicable permits and DCR's Special Use policy and guidelines apply.

[38] Information about DCR's Special Use Permit program is available at http://www.mass.gov/dcr/permits/

E. Commercial wind installations and commercial solar installations are subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

F. Granting rights for new transmission lines is subject to legislative action, pursuant to Article 97 of the Constitution of the Commonwealth. In addition, in such circumstances, appropriate consideration would be given to Secretary of Energy and Environmental Affairs' "No Net Loss" policy for mitigation of loss of open space. Full environmental permitting and review would also apply.

G. Granting rights for new commercial uses is prohibited except to the extent necessary for activities that advance Woodlands goals.

4.5 Forest Resource Management Plans

The zoning of the Department of Conservation and Recreation Division of State Parks and Recreation lands into Woodlands, Parklands and Reserves will be reflected in edits of the existing, approved Northern Berkshires, Central Berkshires, Southern Berkshires and Western Connecticut Valley Forest Resource Management Plans. The new zones will supersede the Active Forest Resource Management Areas, Intensive Use Areas, and Forest Reserves that were established in these plans.

The existing Forest Resource Management Plans (FRMPs) will be edited to incorporate the guidelines in this document. Editing of the plans will be completed by the Summer 2012. The new zones and guidelines will produce a change in expected outputs and will also be integral to FRMP edits. FRMPs for the Eastern Connecticut, Mid-State, Northeast, and Southeast Management Forestry Districts will be prepared simultaneous to edits of the existing plans. The new plans will use the framework of the existing FRMPs and incorporate the new zones and updated guidelines.

Prior to the completion of edits to the FRMPs, the DCR endeavors to demonstrate excellent forestry projects. Forest management projects will be proposed and conducted in areas of the Woodland Zone in the next year using the updated guidelines in this document. These guidelines will supersede the guidelines in the existing FRMPs while planning and conducting projects during the interim of editing the existing FRMPs.

Glossary

carbon sequestration - the incorporation of carbon dioxide into permanent plant tissues.

clearcut - 1. a stand in which essentially all trees have been removed in one operation —*note* depending on management objectives, a clearcut may or may not have reserve trees left to attain goals other than regeneration; 2. a regeneration or harvest method that removes essentially all trees in a stand — *synonym* clearcutting.

Legal definition from 304 Commonwealth of Massachusetts Regulation 11.00 pursuant to the authority granted under Massachusetts General Law c. 132, §§ 40 through 46

11.05: Standards (1) Cutting Trees (a) Silviculture

2. Clearcutting, coppice cuts, or any regeneration cut leaving less mature trees than those required for a seed tree cut (excepting the removal cut of shelterwood, seed tree or similar systems where, in the judgment of the Director's agent, the advance regeneration is of suitable size and stocking for release) shall meet the following standards:
    a. The maximum size of the opening created shall be ten acres unless the source of the regeneration is seeding from surrounding stands, in which case the maximum size shall be five acres. Clearcuts larger than these limits shall require a specific reason to be given and approved in the forest cutting plan showing that environmental impact is less, or that environmental benefits would be enhanced, by a larger cut. In these cases, the forest cutting plan must also state the silvicultural justification for the larger area and list the provisions necessary to insure adequate regeneration and mitigation of environmental impacts.
    b. Clearcuts separated by less than 100 feet of forest maintained at or above "BLevel"stocking shall be considered to be one clearcut.
    c. Clearcutting cannot occur within filter and buffer strips, on slopes of 60% or more, or within wetlands.
    d. Where regeneration of a clearcut is to be obtained by seeding from surrounding uncut mature stands of light-seeded species, the clearcut shall be so shaped that all parts are within the effective seeding range of the dominant tree species within the adjoining uncut mature timber stand. The adjoining stand must be at least 2½ acres in size.

commercial harvesting - the practice of forestry with the object of producing timber and other forest produce as a business enterprise or for sale to a business enterprise

developed (soils) - Refers to levels of soil formation/evolution and soil horizon formation/evolution. Soil development is influenced by climate, living organisms (especially vegetation), nature of parent material, topography and time. Soil formation and development begins with the accumulation of parent material. As the biotic and abiotic influences affect the accumulating parent material, soils form horizons or layers. More complex or developed soils generally have more, well defined layers and generally are more productive in regards to supporting complex vegetative communities.

early successional habitat – the condition of forest vegetation, in terms of species composition and structure, that is found in the early seral or successional stages of forest development. This habitat is

made up predominantly of grasses, forbs, seedlings, and shrubs, and provides an environment for a diversity of birds, mammals and invertebrates.

ecological land unit - areas of land and water having similar characteristic combinations of physical environment (such as topography, climate, geomorphic processes, geology, soil, and hydrology), biological communities (such as plants, animals, microorganisms, and potential natural communities), and human factors (such as social, economic, cultural, and infrastructure).

ecosystem services – benefits provided by ecological resources and processes. These services can be broken into four broad categories: provisioning, regulating, supporting and cultural.

forest health - A healthy forest condition is defined as a vibrant mix of native tree and other plant species naturally associated with soils and other physiognomic conditions present.

forestry - the profession embracing the science, art, and practice of creating, managing, using, and conserving forests and associated resources for human benefit and in a sustainable manner to meet desired goals, needs, and values —*note* the broad field of forestry consists of those biological, quantitative, managerial, and social sciences that are applied to forest management and conservation; it includes specialized fields such as agroforestry, urban forestry, industrial forestry, nonindustrial forestry, and wilderness and recreation forestry.

late successional habitat – forest structural condition that resembles or is in the latest seral or successional stages of forest development. The structural condition includes live and dead (snags) standing trees that are large and often old for their species. The canopy of mature cohorts has gaps and complex vertical structure; there is a variety of tree sizes and ages. Overstory tree crowns have morphology and architecture that provides nesting and roosting opportunities for raptors. The understory is generally developed and patchy and contains significant amounts of down woody debris. The environment of late successional habitat supports distinct associated flora and fauna species, sustains a high level of forest biodiversity and is a significant carbon sink.

merchantable - 1. *of trees, crops, or stands* having the size, quality, and condition suitable for marketing under a given economic condition, even if not immediately accessible for logging; 2. *of a bole or stem* the part(s) suitable for sale; 3. *of lumber* the commercial size or grade of round or sawn timber or of other forest produce, or the entire output of a sawmill except for mill **cull**s

micro-site conditions – specific conditions (temperature, humidity, sunlight, nutrient availability, soil physical characteristics, vegetation cover) different from the surrounding area. These conditions are created in a small area by features such as a rock outcrop, log, stump, small depression or similar feature.

old growth forest - the (usually) late successional stage of forest development —*note 1.* old-growth forests are defined in many ways; generally, structural characteristics used to describe old-growth forests include (a) live trees: number and minimum size of both seral and climax dominants, (b) canopy conditions: commonly including multilayering, (c) snags: minimum number of specific size, and (d) down logs and coarse woody debris: minimum tonnage and numbers of pieces of specific size —*note 2.* old-growth forests generally contain trees that are large for their species and site and sometimes decadent

(overmature) with broken tops, often a variety of tree sizes, large snags and logs, and a developed and often patchy understory —*note 3.* stand age, although a useful indicator of old growth, is often considered less important than structure because (a) the rate of stand development depends more on environment and stand history than age alone, and (b) dominants are often multiaged —*note 4.* due to large differences in forest types, climate, site quality, and natural disturbance history (e.g., fire, wind, and disease and insect epidemics), old-growth forests vary extensively in tree size, age classes, presence and abundance of structural elements, stability, and presence of understory —*note 5.* the minimum area needed for an old-growth forest to be a functional ecological unit depends on the nature and management of surrounding areas; small areas often do not contain all old-growth elements —*note 6.* an old-growth forest is commonly perceived as an uncut, virgin forest with very little human-caused disturbance; some believe that the time taken for stands to develop old-growth structure can be shortened by silvicultural treatments aimed at producing the above characteristics —*synonym* primary forest

productivity - 1**.** *ecology* the rate at which biomass is produced per unit area by any class of organisms; 2. *ecology* the rate of new tissue formation or energy utilization by one or more organisms; 3. *ecology* the capacity or ability of an environmental unit to produce organic material; 4. *ecology* the ability of a population to recruit new members by reproduction; 5. *management* the relative capacity of an area to sustain a supply of goods or services in the long run

redundancy – overlapping or duplicate function; in the context of forest reserve redundancy, this means that if one forest reserve is lost to disease, invasive species, pests or natural or anthropogenic disturbances, there is another similar forest reserve that functions in an ecologically similar way. Two forest reserves that are not redundant would be a Northern hardwood forest stand on *steep slopes* and a pitch pine – scrub oak forest stand on *dry flats, acidic sed/metased* (these are "Ecological Land Unit" terms as defined by The Nature Conservancy) since each has a unique and different ecological function.

regeneration method -a cutting procedure by which a new age class is created; the major methods are clearcutting, seed tree, shelterwood, selection, and coppice —*synonym* reproduction method.

reserve tree - a tree, pole-sized or larger, retained in either a dispersed or aggregated manner after the regeneration period under the clearcutting, seed tree, shelterwood, group selection, or coppice methods —*synonym* standard, green tree retention

silviculture - the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

snag - 1. a standing, generally unmerchantable dead tree from which the leaves and most of the branches have fallen —*note* for wildlife habitat purposes, a snag is sometimes regarded as being at least 10 in (25.4 cm) in diameter at breast height and at least 6 ft (1.8 m) tall; a hard snag is composed primarily of sound wood, generally merchantable, and a soft snag is composed primarily of wood in advanced stages of decay and deterioration; 2. a standing section of the stem of a tree, broken off usually below the crown; 3. a sunken log or a submerged stump or tree; 4. the projecting base of a broken or cut branch on a tree stem

succession - the gradual supplanting of one community of plants by another ; the sequence of communities is called a sere, or seral stage.

tip-up mound topography – forest soil disruption caused by falling trees

References used to compose definitions:

Brady, N. C. 1974. *The Nature and Property of Soils*. Macmillan Publishing Co., Inc., New York. 639 pp.

D'Amato, A., and P. Catanzaro. 2009. A Forest Managers Guide to Restoring Late Successional Forest Structure. University of Massachusetts Extension, Amherst, MA. 8 pp.

Helms, J.A. (ed.). 1998. *The Dictionary of Forestry*. Society of American Foresters, Bethesda, MD. 210 pp.Society of American Foresters. *The Dictionary of Forestry*. http://www.dictionaryofforestry.org/. 2011.

Smith, D.M., J.K Larson, M.J. Kelty, and P.M.S. Ashton. 1997. *The Practice of Silviculture : Applied Forest Ecology*. Wiley, New York. 537 pp.

Trani, M.K., R.T. Brooks, T.L. Schmidt, V.A. Rudis, and C. M. Gabbard. 2001. *Patterns and trends of early successional forests in the eastern United States*. Wildlife Society Bulletin 29:413-424.

Personal email communication with Paul Catenzaro; March 3, 2011

Personal email communication with Dave King and Matthew Kelty; March 2, 2011

Appendices

Appendix 1. Contributors

Appendix 2. DCR properties on public water supply watersheds.

Appendix 3. Summary of the Recreation Opportunity Spectrum

Appendix 4. Silvicultural Levels and Guidelines

Appendix 5. GIS Models Descriptions

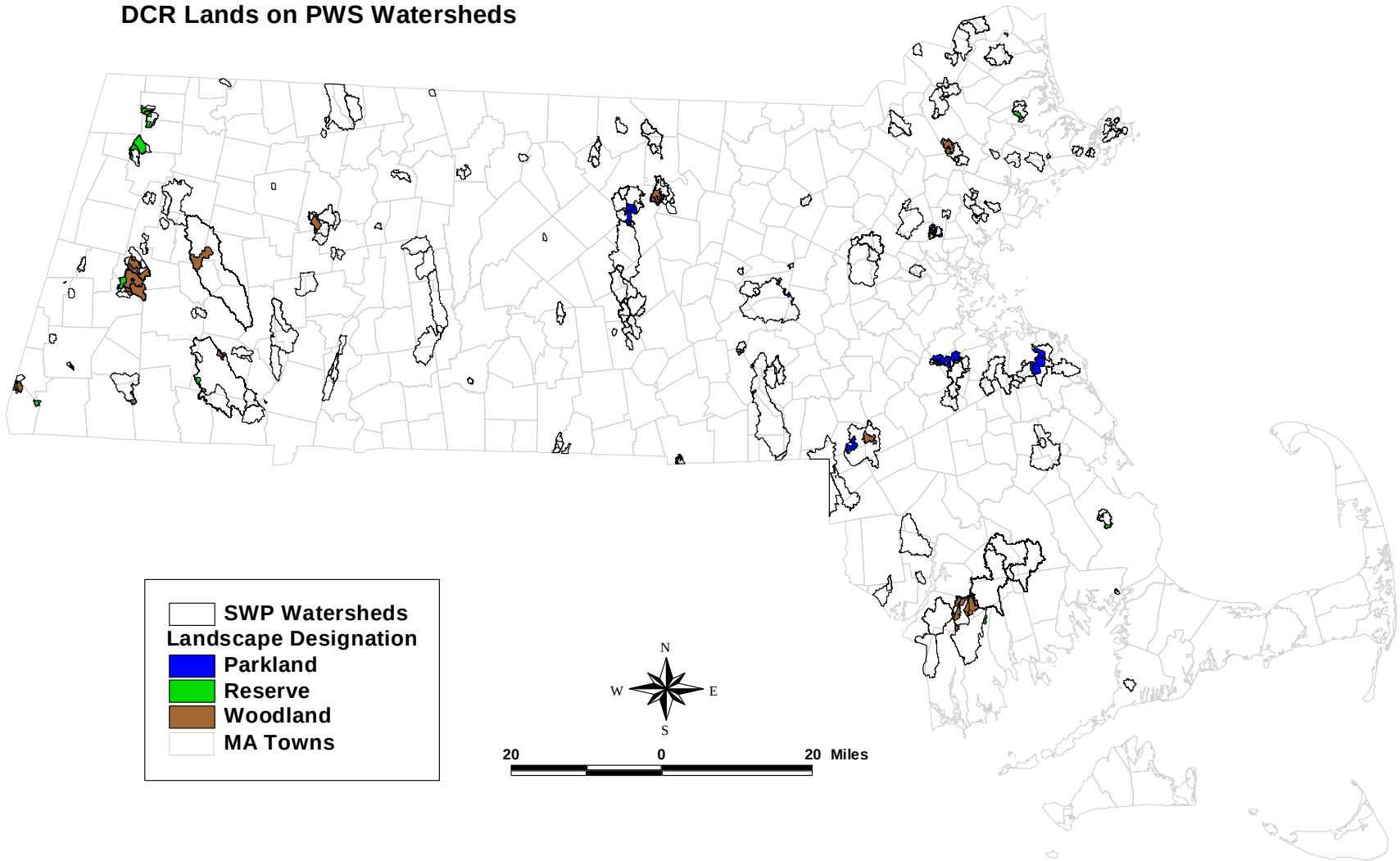
Appendix 1. Contributors

	Department of Conservation and Recreation
Gary Briere	Chief, Bureau of Recreation
Dave Celino	Chief Fire Warden
Peter Church	Director of Forest Stewardship
Mike Fleming	Planner, Bureau of Forestry
David Goodwin	Assistant Program Manager, Management Forestry
William Hill, CF	Program Supervisor, Management Forestry
Paul Jahnige	Director, Greenways & Trails Program
Chandreyee Lahiri	GIS Specialist, GIS Office
Nathanael Lloyd	Director, GIS Office
Paul Lyons	Environmental Analyst, Division of Water Supply Protection
Joe Orfant	Director, Bureau of Planning & Resource Protection
Tim Rayworth	Environmental Education Coordinator, Bureau of Ranger Services
Jessica Rowcroft	Planner, Office of Regional Planning
Chris Williams	Deputy Chief Park Ranger, Bureau of Ranger Services
Tim Zelazo	District Manager, Division of State Parks
	Department of Fish and Game
Tom O'Shea	Assistant Director of Wildlife
John Scanlon	Forestry Project Leader
	Executive Office of Energy and Environmental Affairs
Stephanie Cooper	Assistant Secretary for Land and Forest Conservation
Gary Davis	General Counsel
Bob O'Connor	Director of Land and Forest Conservation

Appendix 2. DCR properties on public water supply watersheds.

Some DCR properties lie within the watersheds of public water supply reservoirs, and thus may require special management attention to minimize adverse impacts on water quality. Designation of these watershed lands as Woodlands would provide for maximum management flexibility. However, for various reasons, some of these lands were designated as Reserves or Parklands. In such cases, the Management Guidelines (see the **Water and Soil Resouces Guidelines** in Sections 2.4 and 3.3) allow for "appropriate management activities" to be undertaken on those lands, after consultation with the public water supplier and/or DEP, to address water quality protection issues (e.g., due to wildfires, insect or disease outbreaks, or other unanticipated threats to water quality.)

The following map and table show locations of these watershed lands, and identify the DCR facility name and the proposed Landscape Designations for those properties.


DCR Lands on PWS Watersheds
SWP Watersheds
Landscape Designation
Parkland
Reserve
Woodland
MA Towns
N
W
E
S
20
0
20 Miles

DCR Facilities on municipal public water supply (PWS) watersheds, with proposed designations.

DCR Facility Name	Designation	PWS Name	Type of PWS
ACUSHNET CEDAR SWAMP STATE RESERVATION	R	FALL RIVER WATER DEPARTMENT	ESW
ALEWIFE BROOK PARKWAY	P	CAMBRIDGE WATER DEPARTMENT	SW
ANGLE TREE MONUMENT RESERVATION	P	ATTLEBORO WATER DEPT	SW
APPALACHIAN TRAIL CORRIDOR	P	PITTSFIELD DPU WATER DEPT	SW
APPALACHIAN TRAIL CORRIDOR 3	R	DALTON FIRE DISTRICT	ESW
ASHBURNHAM STATE FOREST	W	ASH/WIN JOINT WATER AUTHORITY	SW
ATTITASH PUBLIC ACCESS	P	AMESBURY DWP WATER DIV.	SW
BAY CIRCUIT TRAIL	P	IPSWICH DPU WATER DEPT	SW
Bike Trail: Fresh Pond Sidepath	P	CAMBRIDGE WATER DEPARTMENT	SW
Bike Trail: Southern New England Trunkline	P	RHODE ISLAND SOURCE	RI
BLUE HILLS RESERVATION	P	BRAINTREE WATER & SEWER DEPT.	SW
BOAT RAMP	P	RHODE ISLAND SOURCE	RI
C.M. GARDNER STATE PARK	P	SPRINGFIELD WATER & SEWER COMMISSION	SW
C.M. GARDNER STATE PARK	P	SPRINGFIELD WATER & SEWER COMMISSION	ESW
CALLAHAN STATE PARK	P	MWRA	ESW
CHESTER-BLANDFORD STATE FOREST	W	SPRINGFIELD WATER & SEWER COMMISSION	SW
CHESTER-BLANDFORD STATE FOREST	W	SPRINGFIELD WATER & SEWER COMMISSION	SW
CONWAY STATE FOREST	W	NORTHAMPTON WATER DEPT	SW
CONWAY STATE FOREST	W	SOUTH DEERFIELD WATER SUPPLY DIST	SW
DOUGLAS STATE FOREST	R, (P)	RHODE ISLAND SOURCE	RI
EAST MOUNTAIN STATE FOREST	R	GREAT BARRINGTON FIRE DIST	ESW
F. GILBERT HILLS STATE FOREST	W	ATTLEBORO WATER DEPT	SW
FLYNN RINK	P	MWRA	ESW
FRANKLIN STATE FOREST	P	RHODE ISLAND SOURCE	RI
FREETOWN-FALL RIVER STATE FOREST	W, (P)	FALL RIVER WATER DEPARTMENT	ESW
FREETOWN-FALL RIVER STATE FOREST	W	NEW BEDFORD DEPT. OF PUB. INFRASTRUCTURE	SW

FREETOWN-FALL RIVER STATE FOREST	W	TAUNTON WATER DEPARTMENT	SW
FRESH POND PARKWAY	P	CAMBRIDGE WATER DEPARTMENT	SW
GARDNER VETERANS SKATING RINK	P	GARDNER WATER DEPARTMENT	SW
HAROLD PARKER STATE FOREST	W, (P)	DANVERS WATER DEPT.	SW
HUNTINGTON STATE FOREST	W	HOLYOKE WATER WORKS	SW
LEOMINSTER STATE FOREST	W	FITCHBURG DPW, DIV. OF WATER SUPPLY	ESW
LEOMINSTER STATE FOREST	W	LEOMINSTER WATER DIVISION	SW
LEYDEN STATE FOREST	W	GREENFIELD WATER DEPARTMENT	SW
LYNN WOODS RESERVATION	P	LYNN WATER & SEWER COMM	SW
MARLBOROUGH-SUDBURY STATE FOREST	W, (P)	MAYNARD DPW, WATER DIVISION	ESW
MARLBOROUGH-SUDBURY STATE FOREST	W	MWRA	ESW
MAUDSLAY STATE PARK	P	NEWBURYPORT WATER DEPARTMENT	SW
MIDDLESEX FELLS RESERVATION	P	MWRA	ESW
MIDDLESEX FELLS RESERVATION	P	WINCHESTER WATER DEPT	SW
MONTAGUE STATE FOREST	W	TURNERS FALLS WATER DEPT	ESW
MOUNT EVERETT STATE RESERVATION	R	BERKSHIRE SCHOOL	ESW
MOUNT GREYLOCK STATE RESERVATION	R	ADAMS FIRE DISTRICT	ESW
MOUNT GREYLOCK STATE RESERVATION	R, (P)	CHESHIRE WATER DEPT	ESW
MOUNT GREYLOCK STATE RESERVATION	R, (P)	NORTH ADAMS WATER DEPT	SW
MOUNT GREYLOCK STATE RESERVATION	R	WILLIAMSTOWN WATER DEPT	ESW
MOUNT TOM STATE RESERVATION	P	HOLYOKE WATER WORKS	ESW
MOUNT WASHINGTON STATE FOREST	W, (R)	EGREMONT WATER DEPT	SW
MYLES STANDISH STATE FOREST	R	PLYMOUTH WATER DEPARTMENT	ESW
OCTOBER MOUNTAIN STATE FOREST	W, (R), (P)	LEE WATER DEPT	SW
OCTOBER MOUNTAIN STATE FOREST	W, (R)	PITTSFIELD DPU WATER DEPT	SW
ORANGE STATE FOREST	R	ORANGE WATER DEPT	ESW
PERU STATE FOREST	W	SPRINGFIELD WATER & SEWER COMMISSION	SW
Pine Swamp	P	IPSWICH DPU WATER DEPT	SW
SANDISFIELD STATE FOREST	W	MONTEREY WATER COMPANY	ESW
SE MASS BIORESERVE	W	FALL RIVER WATER DEPARTMENT	SW

SE MASS BIORESERVE	W	NEW BEDFORD DEPT. OF PUB. INFRASTRUCTURE	SW
SE MASS BIORESERVE	W	TAUNTON WATER DEPARTMENT	SW
SOUTH NEW ENGLAND TRUNKLINE TRAIL	P	RHODE ISLAND SOURCE	RI
SOUTH WATUPPA BOAT RAMP	P	FALL RIVER WATER DEPARTMENT	ESW
STONE ZOO	P	MWRA	ESW
TOLLAND STATE FOREST	R	SPRINGFIELD WATER & SEWER COMMISSION	SW
TYLER FLOOD CONTROL SITE	P	MARLBOROUGH DPW WATER DIV.	SW
UPTON STATE FOREST	W	RHODE ISLAND SOURCE	RI
UPTON STATE FOREST	W	WESTBOROUGH WATER DEPARTMENT	SW
WACHUSETT MOUNTAIN STATE RESERVATION	P	FITCHBURG DPW, DIV. OF WATER SUPPLY	SW
WACHUSETT MOUNTAIN STATE RESERVATION	P	WORCESTER DPW, WATER SUPPLY DIVISION	SW
WESTMINSTER STATE FOREST	W	FITCHBURG DPW, DIV. OF WATER SUPPLY	SW
WILLOWDALE STATE FOREST	R	IPSWICH DPU WATER DEPT	SW
WINDSOR STATE FOREST	W	PITTSFIELD DPU WATER DEPT	SW
WOMPATUCK STATE PARK	P	COHASSET WATER DEPT	SW
WOMPATUCK STATE PARK	P	HINGHAM/HULL AQUARION WATER CO	SW
WORTHINGTON STATE FOREST	W	SPRINGFIELD WATER & SEWER COMMISSION	SW
WRENTHAM STATE FOREST	P	ATTLEBORO WATER DEPT	SW

Designations – R = Reserves; P = Parklands; W = Woodlands

Type of PWS – ESW = Emergency Surface Water supply; RI = Rhode Island PWS; SW = active Surface Water supply

Appendix 3. Summary of the Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum: A Model for Forest and Park Management and Decision-Making

The Recreation Opportunity Spectrum (ROS), developed by the US Forest Service, can provide a consistent and valuable methodology for resource management planning, recreation decision-making and forest and parks management. First introduced in 1979, ROS has been tested and refined to reflect diverse geographical conditions and specific resource types.[39] In 2003, the forest service published an implementation guide that specifically addresses the unique characteristics of non-federal lands in the Northeast such as the DCR Forests and Parks system.[40]

At the heart of the ROS is the recognition that land managers provide "experiences" not simply "activities" such as hiking, camping or boating. A recreation experience is determined not only by what people do on the land itself but, more importantly by the "setting" that the forest or park provides. The character of that setting is dictated by the:

- physical attributes such as size, topography and vegetation;
- social attributes such as visitor volumes and behaviors; and
- management attributes such as the fees, property maintenance, signage, or staffing.

It is the combination of these attributes that truly determine the quality and character of the park and the experience it provides.

By adopting the ROS, land managers "classify" forests and parks into ROS classes. These classes range from urban / highly developed settings on one end of the spectrum to primitive settings at the other.

ROS Classes
Highly Developed – Developed Natural – Undeveloped Natural – Semi-Primitive – Primitive

Each of these ROS classes can be identified through a set of objective criteria, and each class provides a different set of experiences to users and a different set of guidelines for management. A successful park system will offer and manage properties across the range of ROS classes and thus provide opportunities for the full spectrum of recreational experiences and management regimes.

The benefits of adopting the ROS system for DCR are that is can provide the agency with a consistent methodology to:

[39] Clark, Roger N. and George H. Stankey. *The Recreation Opportunity Spectrum: A Framework for Planning, Management and Research*.1979. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. Available at: http://72.41.119.75/Library/Visitor_Experience_Management/Recreation_Opportunity_Spectrum_1979.pdf

[40] More, Thomas A., Susan Bulmer, Linda Henzel,, and Ann E. Mates., *Extending the Recreation Opportunity Spectrum to Nonfederal Lands in the Northeast: An Implementation Guide.* 2003. U.S. Department of Agriculture, Forest Service, Northeastern Research Station. Available at: http://www.fs.fed.us/ne/newtown_square/publications/technical_reports/pdfs/2003/gtrne309.pdf

- Create quality and diverse of settings and experiences across the Commonwealth's system of parks, forests and reservations and view individual properties in a regional and statewide context;
- Establish rational and consistent basis for recreation planning and land management;
- Systematically evaluate what activities that may be compatible with the specific setting and experience;
- Consider the relative demand for various recreation opportunities;
- Equitably determine desired recreation opportunity levels;
- Identify gaps between the system's current and desired recreation experiences and opportunities;
- Identify outreach and marketing strategies that assist consumers to make informed decisions about recreational choices.

The ROS process and results provide critical information for addressing recreational use conflicts and become essential ingredients in DCR's expanding resource management planning and forest management planning efforts.

Appendix 4. Silvicultural Levels and Guidelines

Silviculture Level One - Intended for the protection of ecologically or culturally significant areas within woodlands, producing timber crops is not an objective. Commercial harvests are often excluded or deferred. Not harvesting timber will most often be the Level One silvicultural choice. Cutting that does occur at Level One will be for site specific purposes such as:

- Controlling the spread of invasive pathogens, insects or plants.
- Removing hazardous trees along trails.
- Promoting habitat for rare and endangered species.
- Protection of cultural resources

Reasons for choosing to exclude harvest at Level One include:

- Wetlands and vernal pools.
- Riparian and trail buffers
- Old-growth forests
- Endangered species habitat and rare natural communities – appropriate surveys will be conducted. No harvests where Conservation Management Practices (CMPs) recommend this.
- Wildlife habitat – Patch retention to meet diversity goals primarily to meet species habitat requirements.
- Areas of historical and cultural significance, where harvesting activities could destroy a resource.
- Steep slopes.

Silviculture Level Two – Forestry performed at this level will be used to create and enhance vertical structure, multiple age classes, tree species diversity and large tree size classes. This level of silviculture will be used to restore late-successional forest structure and characteristics. Where sites are high priority for this approach (buffers to Reserves or adjacent to high quality late successional stands), trees will be retained to older ages and more downed woody debris will be retained. Those forest stands that have the immediate potential for significant diversity and are rated high from a productivity standpoint will be treated with silviculture that enhances diversity and protects productivity.

Guidelines for Silviculture – Regeneration Methods:
Regeneration Methods that resemble the regeneration results of small scale natural disturbance; manage to create and maintain uneven conditions on many scales of resolution (stand to landscape)

A. Single Tree and very small group selection
    a) Variable size group selection; from single tree to 1/3 acre
        i) The model to determine opening size will be species shade tolerance
            (1) Increasing shade tolerance = smaller gap
            (2) Decreasing shade tolerance = larger gap

B. Irregular and two age systems
    a) Two age systems

i) Use on current even age stands with species that have moderate to low shade tolerance – new openings up to 1/3 acre

b) Irregular shelterwood

i) Irregular gaps up to 1/3 acre, forest structure, and heights of trees at stand level scale. Expand on areas of advanced regeneration reserving individual and groups of large trees.

Additional Guides for implementing Silviculture Level Two

A. Openings will be variably shaped.
B. Areas adjacent to openings will be thinned to enhance wildlife benefits and light conditions of openings.
C. All timber sale treatments must take aesthetics into high consideration. Adhere strictly to roadside buffer requirements. Landing location and rehabilitation are paramount. Enhance aesthetics; consider scenic vistas and wildlife viewing areas.

Silviculture Level Three – Forest management practiced at this level will work with those stands that are less productive and less structurally diverse. The stands treated with this level of silviculture are generally even aged and are on less developed, less complex soils. Silviculture at this level will work to add diversity to high graded or lower productivity stands. Level Three Silviculture will be the least commonly practiced type of silviculture in DCR Woodlands.

Guidelines for Silviculture – Regeneration Methods:

A. Advanced Regeneration present

a) Irregular Shelterwood with openings up to 5 acres with reserves/green tree retention

b) Single Tree and small group selection with openings up to 1/3 acre on relatively higher productivity sites and with desirable shade tolerant species present.

B. Advanced Regeneration not present

a) Clearcut, Shelterwood or Seed Tree with reserves/green tree retention with openings up to 5 acres.

b) Single Tree and small group selection with openings up to 1/3 acre on relatively higher productivity sites and with desirable shade tolerant species present.

Additional Guides for Implementing Silviculture Level Three

A. Conduct thinning in immature stands to promote growth on high quality, desirable trees.[41]

[41] If forest stands considered for treatment in this level are less than approximately 100 years, thinning should be considered as an intermediate treatment to prepare the stand for regeneration at a later time. Thinning will maintain a cover of trees for an extended period, redistribute the growth potential of the site on more desirable higher quality trees, and allow residual trees to adjust to changing conditions (increased light, and exposure to wind).

B. Promote diversity in size and shape of harvest openings.
C. Select Reserve or Legacy trees to be left in harvest openings that exceed 1/3 acre (see guidelines below in **Wildlife Structural and Coarse Woody Debris Guidelines**).
D. Aesthetics are a premium goal in the results of timber sale treatment. Adhere strictly to roadside buffer requirements. Landing location and rehabilitation are paramount. Enhance aesthetics; consider scenic vistas and wildlife viewing areas.

Silviculture at this level will be also used to create habitat conditions for species that require forests in the earliest stages of succession and young forests less than 10 years old. Even-aged silviculture harvesting regeneration systems such as clearcut, shelterwood and seed tree (all with reserve trees) will be used to create forest openings of various sizes up to 5 acres using a public and expert consultative process, and will require approval from the DCR Commissioner. Emphasis will be on regenerating forest habitat in strategically selected areas ("pasture pine", recently high graded stands adjacent to other open habitat or young forests) and allowing the forest habitat to develop through many successional stages. The practice should be shifted across the landscape of DCR's Woodlands.

For each management forestry district, stands appropriate for early successional habitat will be mapped and prioritized working with DFW staff. DFW will advise DCR on the appropriate amount of early successional habitat needed for the district given landscape wildlife conditions and will advise DCR on the best location and timing of early successional habitat projects. An expanded public input process will occur for openings planned larger than 1/3 of an acre. Openings between 1/3 and5 acres will be proposed on the advice of DFW (based on the Massachusetts State Wildlife Action Plan) and will require approval from the DCR Commissioner. This type of forestry has three goals: 1. to restore diversity to sites degraded from past land use; 2. to add to needed wildlife habitat for wildlife species of greatest conservation need identified in the state Wildlife Action Plan that benefit from larger patches of early-successional forest habitat; and 3. to demonstrate to other landowners how to conduct scientifically-based habitat restoration projects.

Wildlife Structural and Coarse Woody Debris Guidelines

*Where forest vegetation management occurs, the following guidelines apply***:**

A. Retain 1 to 3 live, large diameter (where possible >18" dbh) trees per acre and 4 live, 12" to 18" dbh trees per acre that have the potential to serve as cavity and den trees and future snags. Retention trees should be distributed uniformly, clumped or grouped, providing a random uneven distribution over the entire treatment area leaving an average of approximately 5 live, future snag trees retained per acre. Groups or clumps of future snag retention should coalesce to island patches in even age management systems providing vertical structural diversity and protection to larger legacy trees. A greater number of legacy trees should be left in riparian areas.

B. Retain all dead snags and stubs in harvest areas as safe operating conditions will allow. Leave a minimum of five snags greater than 10 inches dbh where they exist.

C. Retain on average one of the oldest, largest diameter, well formed, dominant trees (where possible > 18" dbh) per acre in harvested areas to serve as legacy trees.

D. Downed woody material (DWM) including coarse woody debris (CWD) should be maintained on site based on forest type and site productivity, generally following the Forest Guild guidelines for DWM retention. All DWM on site prior to the harvest will be retained. Maintain a minimum of at least two cords (256 cubic feet) per acre of down coarse woody debris (material 5" or greater at the tip and at least 4' long) for ground dwelling amphibians, mammals, insects, and nutrient recycling. When available, highest priority will be given to leaving large, cull logs that will remain for long periods of time.

E. Provide a diversity of horizontal and vertical forest structures by retaining both individuals and groups of trees during final release regeneration harvests and by protecting desirable advanced regeneration

Whole Tree Harvesting and Woody Biomass Removal – Biomass refers to vegetation removed from the forest, usually logging slash, small-diameter trees, tops, limbs, or trees not considered merchantable in traditional markets. Biomass harvesting often done in forestry operations with "whole tree harvesting" refers to the removal of logging slash, small-diameter trees, tops, or limbs. On DCR harvests this tool may be used to:

1. Thin non-sawtimber quality trees from forest stands to redistribute growth on generally larger, more desirable retention trees that will develop into high quality, high value individuals. In developing stands chosen to direct on a path to late successional characteristics, whole tree harvesting can provide the economic means to cut non commercial size trees.
2. Intentionally impoverish site conditions and reduce fuel loads when converting plantations on sand-plain ecosystems to native scrub oak, tree oak and pitch pine vegetation communities.
3. Improve and maintain aesthetics where visuals are a significant concern by reducing slash levels during a timber harvest.

The use of whole tree harvesting will not dictate silviculture but will allow these discussed practices to take place in the absence of a market for low quality timber. With rare exceptions, all timber sales regardless of the use of whole tree harvesting will adhere to minimum coarse woody debris retention standards in **Wildlife Structural and Coarse Woody Debris Guidelines** above and retain 256 cubic feet of down wood material. Possible rare exceptions may be to minimize forest fuel loading or to meet a particular wildlife species requirement.

These guidelines have been drafted recognizing the Massachusetts Department of Energy Resources (DOER) has filed proposed regulations pertaining to the eligibility of biomass generation units to receive Renewable Energy Certificates (RECs) under the state's Renewable Energy Portfolio Standard (RPS). The guidelines below provide direction to the forest manager for woody biomass retention and removal and are separate from the DOER proposed regulations in practice. Purchasers of a DCR timber sale will have to determine independently how much, if any of the biomass removed will qualify for renewable energy credits. Note also that DCR, in collaboration with its Forestry Committee will be revising the Forest Cutting Practices regulations with which forest management on DCR lands must always comply. The

agency anticipates that the draft Forest Cutting Practices regulations will include a provision concerning the appropriate percentage of tops and branches to be retained at a particular harvested site.

The Woody Biomass Removal guidelines in this document are based primarily on the Forest Guild publication "Forest Biomass Retention and Harvesting Guidelines for the Northeast".[42] The Forest Guild is a internationally noted organization that "promotes ecologically, economically, and socially responsible forestry - "excellent forestry"- as a means of sustaining the integrity of forest ecosystems and the human communitites dependent upon them" The following criteria established by the Forest Guild offer an appropriate model for evaluating sites within the woodlands where forest harvesting takes place.[43]

A. Document soils/productivity in the area covered by Forest Resource Management Plans and specific silvicultural prescriptions. Using Natural Resource Conservation Service (NRCS) soils survey maps identify low nutrient soil series, excessively drained or very poorly drained soils and restrict woody biomass removal. Prescriptions will contain a map indicating soil types underlying the treatment area. Additional information from Forest Productivity Mapping of Massachusetts[44], and the Massachusetts Continuous Forest Inventory site index maps should be used to determine soil productivity.

B. Provide direction within the silvicultural prescription for woody debris retention and removal that is based documented soil productivity.

   a) Do not remove limbs and tops from sites that have low nutrient soils, that are excessively drained or poorly drained, and are rated as low productivity sites unless the object is to impoverish the site, i.e.to help promote and maintain pitch pine – oak savannahs in the southeast.

   b) In areas that do not qualify as low nutrient or low productivity where 1/3 or more of basal area is being removed on a 15 to 20 year cutting cycle, retain 1/4 to 1/3 of tops and limbs.

   c) Increasingly nutrient rich sites (higher productivity) and/or more basal area retention during harvest and/or longer cutting cycle allows for less limbs and tops left on the site to protect site productivity.

C. Timber Sale Contracts will be written so that coarse woody debris, wildlife structural retention standards are met. Contracts will limit the removal of biomass based on the productivity analysis and silvicultural prescription.

D. Plan harvests if at all possible for winter so that removal of leaves and needles from the site is minimized.

---

[42] Forest Guild Biomass Working Group. *Forest Biomass Retention and Harvesting Guidelines for the Northeast*. May 2010, The Forest Guild, Santa Fe, NM. Available at: http://www.forestguild.org/publications/research/2010/FG_Biomass_Guidelines_NE.pdf

[43] Forest Guild Biomass Working Group. *Forest Biomass Retention and Harvesting Guidelines for the Northeast*. May 2010, The Forest Guild, Santa Fe, NM. Available at: http://www.forestguild.org/publications/research/2010/FG_Biomass_Guidelines_NE.pdf

[44] MacConnell, W.P, D.W. Goodwin, and K.M.L. Jones. 1991. *Forest Productivity Mapping of Massachusetts.* Massachusetts Agricultural Experiment Station, Amherst, MA. Research Bulletin Number 735, 45p.

Harvesting and Timber Sale Guidelines

A. All silviculture treatments will be directed by a written prescription developed by Management Forestry Staff and approved by the Program Supervisor. The prescription will contain required information per the outreach policy.[45]

B. Management Foresters will conduct a pretreatment inventory of each proposed timber sale site. Information gathered in the inventory will be the basis for the silvicultural prescription. Pre-treatment inventory will include forest overstory, understory (including herbaceous vegetation/ground cover) and coarse woody debris.

C. Timber Sale Contracts and Cutting plans will be signed by the Management Forestry Program Supervisor representing the landowner, the Commonwealth of Massachusetts.

D. Prior to drafting silvicultural prescriptions foresters will consult with the DCR Staff Archaeologist about cultural resources within a prescription area, and conduct a review of all pertinent and available information on rare and endangered species or wetland resources affecting a prescription area. Field reconnaissance that identifies and maps stone walls, wetland resources and vernal pools will take place prior to drafting prescriptions.

E. Silvicultural Prescriptions will include a preliminary logging plan map.

   a) The logging plan map will be a part of the timber sale prospectus and contract. It will indicate pre -designated primary permanent skid roads.

   b) The logging plan map will indicate wetlands, waterways, areas of rare and endangered species and stone walls to be protected during the harvesting activity.

F. Logging equipment will be appropriate to the forest type and structure, and presence of advanced regeneration. Silviculture will dictate the use of equipment for harvesting. Contracts will list allowed equipment on each timber sale. Permanent haul roads and primary skid roads will be laid out and marked prior to the sale; their location and standards will be specified contractually.

   a) Thinning or uneven age management systems retaining greater than 80 square feet of basal area per acre should use small cable log skidders or cut to length systems coupled with forwarders. Grapple skidders exceeding 120” wheelbase should not be used where average retained basal area exceeds 80 square feet.

   b) Design standards for forestry equipment based on forest conditions and site/soil characteristics for integration in Forest Resource Management Plans.

   c) Logging equipment preferred and allowed for a forestry project will be specified in the silvicultural prescription and timber sale contract.

[45]The current outreach policy can be found at: http://www.mass.gov/dcr/stewardship/forestry/docs/Final%20Public%20Notification%20Policy.pdf . This policy is scheduled to be evaluated and updated by Spring 2011 in anticipation of the completion of the landscape designation process. Amendments will include a public site visit each proposed timber sale project as opposed to only those “Projects that have high public sensitivity”.

d) Proven local experience with equipment will be factored towards accomplishing a silvicultural goal.

e) Timber sale contracts should provide penalties for the destruction of regeneration and residual crop trees to be protected.

G. Trees will be designated for removal with either the "Take Tree" marking method or the "Leave Tree" method. The take tree method will mark/paint at breast height and stump all trees to be cut and or removed. The leave tree method will mark/paint trees at breast height and stump for retention during a harvest; all others are designated for removal. The marking method (take tree, leave tree, color of paint) will be contractual; it will be specified in the contract.

H. Forest management on DCR lands will wherever possible, exceed current Massachusetts "Best Management Practices"[46].

a) Use of Best Management Practices should be documented in silvicultural prescription and timber sale contract.

Recreation and Forestry

The most common recreation forestry interface will be hiking trails within the working woodland zones. These guidelines build upon the approved Forest Resource Management Plans and the TSC recommendations. Official designation of trails will be via the DCR – MA Forest and Parks: Road and Trail Inventory and Survey.

National or significant trails such as the Appalachian Trail will use the following guidelines:

A. DCR will establish a "Primary Corridor" with a 200 foot wide area on each side of trail and a "Secondary Corridor" with a 300 foot wide area on each side of primary trail corridor (a total 500 foot wide area on each side of the trail).

B. In accordance with the Appalachian National Scenic Trail (AT) local management plan and the Memorandum of Understanding (MOU), within the "Primary Zone," the AT will be the "Primary Feature" for which the lands are managed. Forest management practices shall be limited to those practices that are directly beneficial to the Trail, as determined by the local planning process and agreed upon in the Massachusetts Appalachian Trail Management Plan. Should forest management activities take place on adjoining lands, logging trails will avoid crossing the Trail wherever possible.

C. Forest management that takes place within the "Secondary Corridor" of the AT will be consistent with the AT MOU.

D. Should forest management take place within the primary or secondary corridors, skid trails should not cross the AT unless there are no feasible alternatives. If skid trails must cross the trail, they should cross perpendicular to the trail.

[46] Kittredge, David B. and Michael Parker. *Massachusetts Forestry Best Management Practices Manual.* 1999. Prepared for the Massachusetts Dept of Environmental Protection, Office of Watershed Management and the US Environmental Protection Agency, Region 1, Water Division.

E. Forest management within the primary and secondary corridors of other significant trails will be designed to promote native diverse vegetation, large diameter trees, multiple age classes and forest structures, forest health, a safe recreation experience, and quality scenery.

F. Slash, as a result of forest management within 50 feet of the trail, should result in a light and natural appearing forest ground cover.

G. Natural resource managers will coordinate with park supervisors, trail managers and user groups when vegetation management is planned.

All other trails (mapped and officially designated) that interface with forest management will include a 50 foot wide corridor on each side of the road or trail and use these guidelines:

A. Sustainable forest management, including salvage, is allowed within road and trail corridors.

B. Forest management within the trail corridors will be designed to promote native diverse vegetation, large-diameter trees, multiple age classes and forest structures, healthy forest, safe recreation experience, and quality scenery.

C. Slash, as a result of forest management within 25 feet of interior forest, roads, interstate, intrastate, and local trails, shall meet the Massachusetts Slash Law, and should result in a light and natural appearing forest ground cover.

D. Skid trails should avoid crossing trails whenever possible and if crossings are necessary, they should cross perpendicular to the trail.

E. Natural resource managers will coordinate with park supervisors, trail managers and user groups when vegetation management is planned.

F. Natural resource managers will coordinate with park supervisors, local emergency management officials and user groups to determine if “field identified” roads and trails (not mapped or signed) should have corridor forest management guidelines applied, have no special treatment, or should be closed and rehabilitated.

Incentives to Process Wood Locally and Support Local Economies and Communities

A. Prospective timber sale purchasers that are certified under the Commonwealth Quality Seal program will be given a priority incentive in bidding on DCR timber sales. A system will be developed where qualified, prospective purchasers/bidders who meet the requirements of the Commonwealth Quality Seal program will be given a “priority points” towards the award of the contract.

Appendix 5. GIS Models Descriptions

[NOTE: The "Woodlands" model is described below. Further descriptions of the Parklands and Reserves model will be added at the future date.]

Active Forest Management Model Used to Rank Woodlands

Plain English Guide

The purpose of this model is to identify the best DCR DSPR lands for Active Forest Management (AFM) based on the recommendations of the DCR Technical Steering Committee (TSC). It uses a number of input datasets (described below) to rank land based on assigned values to produce this relative ranking of Woodlands.

Each of the twelve TSC criteria is weighted evenly. Output grids are created for 95.5% of all DCR DSPR lands (the remaining 4.5% did not have data to support the model). The actual GIS processes used are described in the "Active Forest Management Model" document.

TSC Final Recommendations – Suggested Criteria for Woodlands (with Data Sources):

1. *Areas suitable for wood production* - Prime Forest Soils, Vegetation Suitability, Distance from Roads, Past Management
2. *Sites with a history of recent silvicultural treatments* - Past Management
3. *Areas where late successional characteristics could be restored via management* - Late Successional
4. *Forest type diversity* - Forest Diversity
5. *Potential impacts on communities most dependent on the local forest economy* - Distance to Sawmills, Sawmill Woodsheds, Harvester Woodsheds
6. *Areas suitable for early successional habitat creation* - Early Successional
7. *Sites requiring ecological restoration or prone to disturbance* - Ecological Restoration, Prone to Disturbance, Past Areas of Defoliation
8. *Watershed areas that would benefit from active forest manipulation* - Water Supply Protection Zones
9. *Proximity to wood processing facilities* - Distance to Sawmills, Sawmill Woodsheds
10. *Areas where forest management could increase carbon storage* - 2005 Forest Land
11. *Areas with good access for model forest demonstration activities* - Distance from Roads
12. *Suitability of site as a representative of forest type, age class and logging conditions for demonstration purposes* - Past Management, Vegetation Suitability, Fire Risk Areas, Prime Forest Soils

Data Sources and Processes:

1. Prime Forest Soils - ***forest soils with higher productivity are more appropriate for AFM***

High value is given to the most productive soils for growing trees

Low value is given to the least productive soils for growing trees

2. Vegetation Suitability - ***certain forest types of different size and stocking classes are more appropriate for AFM than others***

High value is given to certain tree species that are large in size, overcrowded and would therefore respond well to active management to increase the growing space and encourage the best trees to thrive

Low value is given to certain tree species that are small in size, already have adequate room for growth and therefore don't need active management to realize their highest growth potential

3. Past Management - ***if there has been past management, it has a higher value for AFM and the greater the number of past entries, the higher the value***

High value is given to areas that have been managed more frequently in the past

Low value is given to areas that have not been managed much or at all in the past

4. Late successional - ***forest management can encourage late successional characteristics in certain forest stands***

High value is given to forest areas appropriate for late successional characteristic restoration, such as non-plantations or high stocking (density) or large tree size

Low value is given to forest areas not appropriate for late successional characteristic restoration, such as plantations, medium to low stocking (density) or small tree size

5. Forest Type Diversity - ***forests with lower type diversity are better suited for management – this dataset uses species types, predominance, size class, stocking levels and past disturbance regimes as a measure of forest type diversity***

High value is given to forest areas with the lowest level of diversity since they represent greater opportunities for forest management to increase forest diversity

Low value is given to forest areas with the highest level of diversity since they are already diverse

6. Distance to Sawmills - ***forest lands with shorter travel distances on public and forest roads to sawmills can be harvested more efficiently***

High value is given to areas close to sawmills since it is more economical to move forest products from forest to sawmill (this is based on measured travel distance)

Low value is given to areas far from sawmills since it is increasingly expensive to move forest products from forest to sawmill (this is based on measured travel distance)

7. Sawmill Woodsheds - ***sawmill annual procurement volume ranges determine the effective forest zone of contribution (i.e., woodshed) in determining which forest lands can be harvested more efficiently***

High value is given to areas close to sawmills since it is more economical to move forest products from forest to sawmill (this is based on non-road linear distance)

Low value is given to areas far from sawmills since it is increasingly expensive to move forest products from forest to sawmill (this is based on non-road linear distance)

8. Harvester Woodsheds - ***lands closer to 2010 licensed timber harvesters have a higher value for AFM, this dataset assumes that for lots > 5 acres, most harvesters would be willing to travel 25 (but not 50) miles based on Kittredge, et al research***

High value is given to areas close to licensed timber harvesters since it is more economical for them to be interested in timber sales on forests closer to their home

Low value is given to areas far from licensed timber harvesters since it is increasingly expensive for them to be interested in timber sales on forests farther from their home

9. Early Successional - ***forest management can encourage early successional habitat creation in certain forest stands***

High value is given to forest areas appropriate for early successional habitat creation such as plantations, certain tree species, small tree size and open areas

Low value is given to forest areas not appropriate for early successional habitat creation (inverse of above)

10. Ecological Restoration - ***forest stands requiring ecological restoration (i.e., restoration of forests with native composition, structure, pattern and ecological processes) are well suited for forest management***

High value is given to forest areas appropriate for ecological restoration such as plantations or pitch pine/scrub oak communities

Low value is given to forest areas not appropriate for ecological restoration (inverse of above)

11. Prone to Disturbance - ***forest stands that are susceptible to natural disturbance are well suited for forest management***

High value is given to forest areas prone to natural disturbances such as insects, fire, windthrow, ice and beaver activity since forest management can help to restore a healthier more resilient forest

Low value is given to forest areas not prone to natural disturbances (inverse of above)

12. Past Areas of Defoliation - ***forest lands within insect infestation, disease outbreak or natural weather event areas have a higher value for AFM***

High value is given to forest areas that have had more recorded tree defoliation occurrences since forest management can help to restore a healthier more resilient forest

Low value is given to forest areas that have had fewer recorded tree defoliation occurrences

13. Water Supply Protection Zones - ***forest lands within public water supply watersheds could benefit from active forest management***

Zone A is land between surface water source and various smaller buffers

Zone B is land between surface water source and various larger buffers

Zone C is land not in Zone A or B but within the watershed of the surface water source

High value is given to forest areas that are within Zones A, B or C

Low value is given to forest areas that are not within Zones A, B or C

14. 2005 Forest Land - ***all forested land both increase the amount of carbon stored and the rate at which carbon is sequestered***

High value is given to forested land

Low value is given to non-forested land

15. Distance from Roads - ***those lands that are closer to roads capable of supporting logging vehicles have a higher value for AFM***

High value is given to areas closer to roads since it is more economical and environmentally sound to access forest products close to a road so new roads don't have to be constructed

Low value is given to areas further from roads since it is more costly and has a greater environmental impact to access these forest products

16. Fire Risk Areas - ***lands with the highest fire risk have the highest value for AFM (includes parameters for vegetation rate of spread and fuel load, topography for fuel moisture (aspect) and fire intensity (slope), and wildland urban interface)***

High value is given to areas with a higher fire risk since they would benefit from forest management to reduce this risk

Low value is given to areas with a lower fire risk

Creating the Final AFM Grid:

Each of the 12 TSC Criteria is weighted evenly (e.g. "Areas suitable for wood production" have 4 inputs and are scaled down and end up with the same weighting as "Forest type diversity" which only has 1 input). The 12 criteria are added up so any area with a value greater than 0 is added to the total score. If an area scores high on most of the 16 datasets described above, it will rank high for Woodlands, if an area scores low on most of the 16 datasets described above, it will rank low for Woodlands. An example of a high score would be an area on productive soils, close to a road, close to a sawmill, with past forest management, in a water supply zone, and prone to natural disturbance. Conversely, an example of a low score would be an area with low fire risk, no past defoliation, far from roads and timber harvesters, with high forest type diversity and small tree size.

Some of the input datasets are used more than once (e.g., Prime Forest Soils, Vegetation Suitability, Distance from Roads, Past Management, Distance to Sawmills and Sawmill Woodsheds). The reason is that Distance from Roads, for example, is useful for ranking areas suitable for wood production as well as areas with good access for model forest demonstration activities. Sawmill Woodsheds, for example, is useful for ranking potential impacts on communities most dependent on the local forest economy as well as proximity to wood processing facilities.

This dataset was classified into 3 categories with the same amount of area representing the categories "Limited", "Important" and "Optimal" for Woodlands.

DCR Property Average

The dataset described above was additionally processed to calculate an average AFM value for each DCR DSPR property (not including new properties acquired since the vegetation data was created in 2003). These property averages were used in the Landscape Zoning designation process and compared to the model outputs for Reserves and Parklands to help guide the decision making process.

Active Forest Management Model – Bare Bones Technical Guide

The purpose of this model is to identify the best DCR DSPR lands for Active Forest Management (AFM) based on the recommendations of the DCR Technical Steering Committee (TSC). It uses a number of vector shapefiles and grids to rank land based on values given each of the input datasets (as described below) to produce this relative ranking of Woodlands.

The model converts all shapefiles to grids (with a value that ranges from 0 to 10) and then adds each of the twelve criteria inputs up. For TSC recommendations that required more than one input data source (#1, 5, 7, 9 and 12 listed below), these datasets had their values added up (e.g. since criteria #1 has four input grids, these values potentially range from 0 to 40). These multiple input source grids were then rescaled down to 0 to 10 so that each of the twelve TSC criteria was weighted evenly. Output grids are created for 95.5% of all DCR DSPR lands (the remaining 4.5% did not have data to support the model). The actual GIS processes used are described in the "Active Forest Management Model" document.

TSC Final Recommendations – Suggested Criteria for Woodlands (with Data Sources):

1. *Areas suitable for wood production* - Prime Forest Soils, Vegetation Suitability, Distance from Roads, Past Management
2. *Sites with a history of recent silvicultural treatments* - Past Management
3. *Areas where late successional characteristics could be restored via management* - Late Successional
4. *Forest type diversity* - Forest Diversity
5. *Potential impacts on communities most dependent on the local forest economy* - Distance to Sawmills, Sawmill Woodsheds, Harvester Woodsheds
6. *Areas suitable for early successional habitat creation* - Early Successional
7. *Sites requiring ecological restoration or prone to disturbance* - Ecological Restoration, Prone to Disturbance, Past Areas of Defoliation
8. *Watershed areas that would benefit from active forest manipulation* - Water Supply Protection Zones
9. *Proximity to wood processing facilities* - Distance to Sawmills, Sawmill Woodsheds
10. *Areas where forest management could increase carbon storage* - 2005 Forest Land
11. *Areas with good access for model forest demonstration activities* - Distance from Roads
12. *Suitability of site as a representative of forest type, age class and logging conditions for demonstration purposes* - Past Management, Vegetation Suitability, Fire Risk Areas, Prime Forest Soils

Data Sources and Processes:

1. Prime Forest Soils - ***forest soils with higher productivity are more appropriate for AFM***

Value: 10 - Prime 1

8 - Prime 2
6 - Prime 3 and 3W
4 - Statewide and SW
2 - Local and LW
0 – Unique and Non-Forest

Input: ***PRIME FOREST SOILS*** (from MassGIS)

Output: ***PFGRID***

This dataset is missing all data from Franklin County – for this areas, we used an average number based on the average value from Berkshire and Hampshire counties = Prime 3 (both counties had this average)

2. Vegetation Suitability - ***certain forest types of different size and stocking classes are more appropriate for AFM than others***

Value of 10 for: MajorGroups		1 White/Red Pine
		2 Hemlock
		3 Spruce-Fir
		5 Northern Hardwoods
		6 Birch – Red Maple
		7 Oak
	or SubTypes	SR Red Spruce
		SF Spruce-Fir
		SN Norway Spruce – White Spruce Plantation
		PP Pitch Pine
		PO Pitch Pine - Oak
		PS Pitch Pine – Scrub Oak
		SO Scrub Oak
	and Stocking	1 High (A or > 120 ft^2/ac)
		2 Medium (B/A or 60 – 120 ft^2/ac)
	and Size	4 Small Sawtimber (10.9 – 15" mmd)
		5 Large Sawtimber (> 15" mmd)
		9 Uneven Aged (3 or more age classes)
Value of 5 for:	Same as "Value 10" except:	
	Stocking	3 Low (C/B or 40 - 60 ft^2/ac)
		4 Sparse (< 40 ft^2/ac)
Value of 1 for:	Same as "Value 10" except:	
	Stocking	all 4 levels
	and Size	1 Seedling (< 1" dbh, < 10' tall)
		2 Sapling (> 1" – 4.6" dbh, < 30' tall)

3 Pole (> 4.6 – 10.9" mmd)

and SubTypes RC Red Cedar
LA Larch Plantation

Value of 0 for: Everything else

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract)

Output: ***VEGGRID***

3. Past Management - ***if there has been past management, it has a higher value for AFM and the greater the number of past entries, the higher the value***

Value 10 - 5 past management entries
9 – 4 past management entries
8 – 3 past management entries
7 – 2 past management entries
6 – 1 past management entries
0 – no past management entries

Input: ***FOREST CUTTING PLANS*** (developed by DCR Management Forestry staff)

Output: ***PASTMANGRID***

4. Late successional - ***forest management can encourage late successional characteristics in certain forest stands***

Value 10 - forest areas appropriate for late successional characteristic restoration
(***inverse of below***)
Non-plantations and
Stocking (1 – high) and
Size (5 – large Sawtimber) and
MajorGroups (1 – 5, 7)

Value 0 – forest areas not appropriate for late successional characteristic restoration
Plantation SubTypes (LA, RP, SN, SP, WL) or SubTypes (PO, PP, PS, SO) or
Stocking (2 – medium, 3 – low, 4 – sparse) or
Size (1 – seedling, 2 – sapling, 3 – pole, 4 – small sawtimber, 9 – uneven aged) or
MajorGroups (0 – non-forest, 6 – birch – red maple, 8 – swamp softwoods, 9 – swamp hardwoods, 10 – water/non-forested wetlands)

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract)

Output: ***LATEGRID***

5. Forest Type Diversity - ***forests with lower type diversity are better suited for management – this dataset uses species types, predominance, size class, stocking levels and past disturbance regimes as a measure of forest type diversity***

Value	10	1 forest type polygon within the analysis area (lowest level of diversity)
	9	2 forest type polygons within the analysis area
	8	3 forest type polygons within the analysis area
	7	4 forest type polygons within the analysis area
	6	5 forest type polygons within the analysis area
	5	6 forest type polygons within the analysis area
	4	7 forest type polygons within the analysis area
	3	8 forest type polygons within the analysis area
	2	9 forest type polygons within the analysis area
	1	10 forest type polygons within the analysis area (highest level of diversity)

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract)

Output: ***DIVERSITYGRID***

6. Distance to Sawmills - ***forest lands with shorter travel distances on public and forest roads to sawmills can be harvested more efficiently***

Value: 10 – within 10 kilometers (6.2 miles)
8 – within 20 kilometers (12.4 miles)
6 - within 30 kilometers (18.6 miles)
4 – within 40 kilometers (24.8 miles)
2 - within 50 kilometers (31.0 miles)
0 – greater than 50 kilometers away (31.0 miles)

Input: ***SAWMILL DISTANCE*** (developed by DCR Management Forestry staff)

Output: ***SAWDISTGRID***

7. Sawmill Woodsheds - ***sawmill annual procurement volume ranges determine the effective forest zone of contribution (i.e., woodshed) in determining which forest lands can be harvested more efficiently***

Value: 10 – > 44 to 52
9 - > 40 to 44
8 – > 35 to 40
7 - > 31 to 35
6 - > 27 to 31
5 - > 21 to 27
4 – >16 to 21
3 - > 13 to 16
2 - > 8 to 13
1 – 0 to 8

Input: ***SAWMILL_WOODSHEDS*** (developed by UMass Department of Natural Resources Conservation and used by permission)

Output: ***SAWMILLGRID***

8. Harvester Woodsheds - ***lands closer to 2010 licensed timber harvesters have a higher value for AFM, this dataset assumes that for lots > 5 acres, most harvesters would be willing to travel 25 (but not 50) miles based on Kittredge, et al research***

Value
10 – > 163 to 201
9 - > 143 to 163
8 - > 123 to 143
7 - > 103 to 123
6 - > 74 to 103
5 - > 34 to 74
4 - > 20 to 34
3 - > 14 to 20
2 - > 5 to 14
1 – 0 to 5

Input: ***HARVESTER_WOODSHEDS*** (developed by UMass Department of Natural Resources Conservation and used by permission)

Output: ***HARVESTERGRID***

9. Early Successional - ***forest management can encourage early successional habitat creation in certain forest stands***

Value (from ***SEWALLVEGETATION***)
10 - forest areas appropriate for early successional habitat creation
Plantation SubTypes (LA, RP, SN, SP, WL) or
Size (1 –seedling, 2 – sapling, 3 – pole) and
MajorGroups (1 – 7)

(from ***LANDUSE2005***)
10 – non forest areas appropriate for early successional habitat creation
Crop (1), Pasture (2), Open (6), Transitional (17), Powerline/Utility (24) or
Brushland/Successional (40)

Value (from ***SEWALLVEGETATION***)
0 – forest areas not appropriate for early successional habitat creation
(inverse of above)

(from ***LANDUSE2005***)
0 – areas not appropriate for early successional habitat creation
(inverse of above)

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract) and ***LANDUSE2005*** (from MassGIS)

Output: ***EARLYGRID***

10. Ecological Restoration - ***forest stands requiring ecological restoration (i.e., restoration of forests with native composition, structure, pattern and ecological processes) are well suited for forest management***

Value 10 - forest stands requiring ecological restoration (plantations or pitch pine/scrub oak)
0 – all other areas

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract)

Output: ***ECORESGRID***

11. Prone to Disturbance - ***forest stands that are susceptible to natural disturbance are well suited for forest management***

Value 10 - forest stands prone to natural disturbance
0 – all other areas

Input: ***SEWALL LAND CLASSIFICATION*** (developed for DCR under contract)

Output: ***DISTURBGRID***

12. Past Areas of Defoliation - ***forest lands within insect infestation, disease outbreak or natural weather event areas have a higher value for AFM***

Value: 10 – 10 and above
9 - 9
8 - 8
7 - 7
6 - 6
5 - 5
4 - 4
3 - 3
2 - 2
1 - 1
0 - 0

Input: ***BUGS34 to BUGS09*** (from MassGIS)

Output: ***DEFOLGRID***

13. Water Supply Protection Zones - ***forest lands within public water supply watersheds could benefit from active forest management***

Zone A is land between surface water source and various smaller buffers

Zone B is land between surface water source and various larger buffers

Zone C is land not in Zone A or B but within the watershed of the surface water source

Value 10 – forest land within water supply protection zone A, B or C
0 – all other land

Input: ***DCR_ID6*** (from MassGIS)

Output: ***WATERGRID***

14. 2005 Forest Land - ***all forested land both increase the amount of carbon stored and the rate at which carbon is sequestered***

Value 10 – forested land
0 – all other areas

Input: ***LANDUSE2005*** (from MassGIS)

Output: ***FORESTGRID***

15. Distance from Roads - ***those lands that are closer to roads capable of supporting logging vehicles have a higher value for AFM***

Value: 10 - Within 750 foot buffer (229 meters)
8 - Within 1,500 foot buffer (457 meters)
6 - Within 2,250 foot buffer (686 meters)
4 - Within 3,000 foot buffer (914 meters)
2 - Within 3,750 foot buffer (1,143 meters)
0 – Outside of 3,750 feet

Input: ***EOTROADS*** (from MassGIS), ***DCR ROAD AND TRAIL DATA*** (developed by DCR Management Forestry staff and consultants) and road data from surrounding states

Output: ***ROADBUFGRID***

16. Fire Risk Areas - ***lands with the highest fire risk have the highest value for AFM (includes parameters for vegetation rate of spread and fuel load, topography for fuel moisture (aspect) and fire intensity (slope), and wildland urban interface)***

Value: 10 - >25 – 45
9 - >24 – 25
8 - >23 – 24
7 - >22 – 23
6 - >21 – 22
5 - >20 – 21
4 - >18 – 20
3 - >14 – 18
2 - >9 – 14
1 - >6 – 9

0 - 0 – 6

Input: ***WLDFR_OLY_RC*** (developed by DCR Management Forestry staff with UMass Department of Natural Resources Conservation)

Output: ***FIREGRID***

Creating the Final AFM Grid:

Each of the 12 TSC Criteria is weighted evenly (e.g. "Areas suitable for wood production" have 4 inputs grids and are scaled down and end up with the same weighting as "Forest type diversity" which only has 1 input) to create the grid ***AFMGRID2*** (values range from 0 to 104). The 12 criteria are added up so any area with a value greater than 0 is added to the total score. If an area scores high on most of the 16 datasets described above, it will rank high for Woodlands, if an area scores low on most of the 16 datasets described above, it will rank low for Woodlands. An example of a high score would be an area on productive soils, close to a road, close to a sawmill, with past forest management, in a water supply zone, and prone to natural disturbance. Conversely, an example of a low score would be an area with low fire risk, no past defoliation, far from roads and timber harvesters, with high forest type diversity and small tree size.

Some of the input datasets are used more than once (e.g., Prime Forest Soils, Vegetation Suitability, Distance from Roads, Past Management, Distance to Sawmills and Sawmill Woodsheds). The reason is that Distance from Roads, for example, is useful for ranking areas suitable for wood production as well as areas with good access for model forest demonstration activities. Sawmill Woodsheds, for example, is useful for ranking potential impacts on communities most dependent on the local forest economy as well as proximity to wood processing facilities.

This grid was classified into 3 quantiles representing the categories "Limited" (0 – 52), "Important" (53 – 60) and "Optimal" (61 – 104).

DCR Property Average

The ***AFMGRID2*** grid was processed to calculate an average AFM value for each DCR DSPR property (not including new properties acquired since the vegetation data was created). These property averages were used in the Landscape Zoning designation process and compared to the model outputs for Reserves and Parklands to help guide the decision making process.